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AMERICAN RAILWAYS



AMERICAN RAILWAYS

BY

EDWIN A. PRATT

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INTRODUCTORY NOTE

THE greater part of the matter contained in the following pages appeared in a series of thirteen articles published in *The Times* between January 5 and June 5, 1903, under the heading of "American Railways," the facts given having been collected during a four months' tour of the United States, made in the winter of 1902-3, and representing a total of about 9000 miles of railway travelling on the American continent.

For the purposes of the present work, however, I have considerably expanded a number of the original articles, and have added several fresh ones—such as "On the Cars," "In the Rockies," "A Mining Camp Railway in Colorado," and "The Santa Fé Trail"—together with sections given in Chapter XIX., "Miscellaneous," under the headings: "The Capture of the Small Shareholder," "The Suburban Traffic Problem at Chicago," "Luggage and Parcels," "The Policy of Combination," "Ton-Mileage Statistics," and "Promotions of Staff in Railway Service."

While seeking to put before the representatives of railway interests in this country a certain degree of practical information which might be of service to them, I have also aimed at interesting the general reader in the subject of American Railways, in regard alike to their origin, their characteristics, and their operation. I have likewise incorporated some references to the present-day expansion of those agricultural, industrial, and commercial interests of the United States to which, far more than to the passenger traffic, the railways of that country are chiefly indebted for such prosperity as they enjoy. In these circumstances I venture to hope that the book will appeal to a somewhat wider circle than would have been the case had it been devoted entirely to the consideration of railway technicalities.

EDWIN A. PRATT.

LONDON, *June* 1903.

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I

A GENERAL SURVEY

THE subject of American railways is one that has attracted very considerable interest in Great Britain of late, not only because of the striking developments which have been brought about in regard especially to their equipment, management, etc., but also because of the comparisons which, in various ways, have been made between those railways and our own. The belief prevails, however, among those who are directly concerned in the working and control of railways on our own side of the Atlantic that the British public in general, and adverse critics in particular, do not sufficiently realise the very material differences which exist in the conditions and circumstances of the two countries, what may be well suited for the one not necessarily being equally suitable and equally practicable in the case of the other. It has been thought desirable, therefore, that some inquiry should be made on the spot into the subject of American railways, not with

any idea either of decrying what the United States may have done or of shutting one's eyes to what Great Britain may have left undone, but in order mainly to point out what the differences of conditions are, and to enable English people who have not themselves crossed the Atlantic to form some idea of the general lines on which the American railways have been developed. It was further thought that such facts and impressions should be gathered and set forth by a writer who would regard the whole subject from the point of view of an ordinary British traveller, rather than with the possible prejudices of a British railway official ; and though the latter would necessarily have a more profound knowledge of technical matters, the balance of advantage was held to be in favour of the former. But in undertaking the mission in question I was granted an absolute discretion in the collection of such facts and in the expression of such views as I might think it desirable to place on record, and of this discretion I have availed myself to the full.

By way of introduction to what may follow, those of the British public who feel any interest at all in the subject in question should recall, in the first place, the particular circumstances in which the railway system of each country was originally brought into being, inasmuch as these circumstances have a material bearing on the general position to-day.

In Great Britain the era of railways followed the era of highways. The towns were settled, carriers' carts went on their regular rounds along well-made roads ;

the country, circumscribed in dimensions, was rich and prosperous, and trade and manufactures were established on such a basis that in those days England was without a rival. But there were serious difficulties for the promoters of railways to overcome. There was a strong and wide-spread prejudice against the introduction of the locomotive at all, every imaginable danger being predicted. There was the keen opposition of one class of land-owners, who feared that with the starting of railways would begin the ruin of their properties; and there was the greed of another class who saw in the new movement a means of enriching themselves by wringing the uttermost farthing out of the railway companies; while coach-owners, horse-breeders, livery men, inn-keepers, and other representatives of vested interests anticipated from the threatened innovation nothing short of their individual extinction. So it was that costly battles had to be fought in Parliament, and large sums had necessarily to be paid for land in an old and thickly-populated country. Then, again, in carrying out the new system of locomotion, regard had to be shown for the fact that society in England was organised under much more complex conditions than in a new country such as the United States. There were well-defined and well-recognised class distinctions, the growth of centuries, for which provision must be made, together with trading customs for which regard must be had. So the "coaches" run on rails took the place of the coaches that ran on roads, just as the "waggon" drawn

by the locomotive took the place of the carriers' carts drawn by horses. In the one case the "quality" had the best accommodation for the highest fare, and in the other the small waggons continued to take to traders the same sized lots as they had been accustomed to receive through the carriers, according to the extent of their business. In addition to all this the English railway companies had to deal with an Imperial Government which had quite as keen a regard for the safety and welfare of the public as it could possibly have for the progress of railways, so that the British companies have been forced, either by law, by the requirements of the Board of Trade, or by the powers possessed by the various district authorities, to build their lines in the most substantial manner, a railway passing through a country district, where it will obtain comparatively little traffic, having to be as perfect in its construction from the point of view of public safety and convenience as a busy suburban or even a main line. The same degree of rigour has been shown, too, in regard to the working of our railways, upon which restrictions are imposed that are unheard of on the other side of the Atlantic.

In America, excepting only the case of New England, the railways preceded the settlement of districts and the building up of the towns. They generally represented the highways along which population was to follow. Of roads in so vast a country there were comparatively few, and in some places they consisted only of logs of

timber which some enterprising individual had laid along a clearing, charging a toll from those who passed over them. In a *Brief History* of their line, published by the Chicago, Milwaukee, and St. Paul Railway Company, it is well said that—"Building railways in Europe from one thickly settled district to another, with abundant capital awaiting investment there, is one thing ; and building lines in a new country, and extending them fifty miles beyond the last farm, calling their terminus 'End of Track,' is another." I have heard, too, from those in a position to know, that when the route for the Illinois Central Railroad between Chicago and Cairo was surveyed in 1852, the men engaged on the task not only found scarcely any white settlers at all on a stretch of country 365 miles in extent—now mostly cultivated—but were greatly troubled by the wolves, which crept into the camp and stole their food.

In all these circumstances the people were glad to get railways of any description in these new territories, for railways were the indispensable preliminary to development of any kind whatever. In England they might, as time went on, be regarded as a promising form of investment for those who had money to spare and had aspirations for dividends. In America they were wanted as a means of supplying the essential needs of communities whose main desire was to open up the resources of the land. All the same, the fact was fully recognised there that even the most primitive lines might eventually become valuable properties. There

was, however, every reason why the strictest economy should be studied at first. Money was scarce, labour was dear, and a high rate of interest had to be paid for the capital that was mainly borrowed from abroad, while from lines built out into the prairie or the back-woods there could be little hope of much return for years to come. Railways were wanted, too, over distances that were really enormous, and so long as the people got them at all they were not particular as to how they were made. It was quantity, not quality, they wanted. So, under all these circumstances, the primary idea of an American railway did not go much beyond the laying of a pair of rails on which a train could move safely. One very great advantage which the promoters had in many parts of the country was in the abundant timber supplies. It was found that, by putting the sleepers (or "ties," as they are called in America) much more closely together than is the case in Great Britain, a fairly solid road-bed could be graded even where there was no other ballast used than the soil dug up alongside the track; and this was still the case even where the absence of any attempt at drainage led to the line becoming, in wet weather, little better than a mud track. A further substantial economy was effected, as compared with an English line of railway, by simply spiking the rails direct on to the sleepers without putting them first on iron chairs. This system was adopted in the first instance because it was cheap. It has since been adhered to because it has been found to

answer, and is even preferred to the English system.¹ Bridges were represented by wooden trestles, the lines of railway ran along or across streets on the same level, little or no attempt was made to reduce heavy gradients, and the signalling arrangements were of the most elementary kind. Still, the people got their railways, and they were happy. There would be time enough to work out improvements when there was more traffic and more money. Then, again, many of the railways, especially in the west, not only got their land for nothing, but had free grants of ten or twenty miles of land on each side of the track which they could sell to prospective settlers. In this way they obtained a share in the enhanced values they were the means of bringing about, while every fresh settler meant a fresh producer, who might be expected to add to the freight or the patronage to be secured by the line. It is true that, later on, such land grants were made less readily, if at all, and in recent years American railways have had to pay large sums in the neighbourhood of great cities for station space and right of way; but the fact remains that originally the cost of land for most of the existing railways in America was insignificant as compared with what many of the British lines have paid. As for legal restrictions, these were practically non-existent in the earlier days of American railways. Welcomed as the predominant partners in the work of national and local development, the railways were left with an almost

¹ See Appendix.

absolute freedom to work out their enterprise in such manner as they thought fit, and it was not until later days, when they had become a power in the land—and when, also, the wide degree of liberty granted to them had led to the creeping in of various abuses—that there was developed a tendency to hedge them round with legislative restrictions.

It is from such primary conditions as these that the railways of the United States, as they exist to-day, have been evolved ; and abundant traces of such conditions are still to be found there. If, however, the lines were cheap to make, they were costly to keep up. The wood used so extensively in the construction alike of roads, buildings, and bridges lasted no more than about eight years, when there would come tremendous bills for renewals. On 100 miles of single-track railway, for instance, with 3000 ties to the mile, it would be necessary to replace 300,000 pieces of timber. It was generally assumed that the cost of these renewals would be met out of the profits, but the latter were not always sufficiently large for that purpose ; and, with lines that did not pay, it was sometimes difficult to raise fresh capital. Many of them consequently got into a deplorably bad condition. Where little or nothing had been spent on them since their construction, they practically required to be rebuilt at the end of eight or ten years. In one instance an engineer who was inspecting a line that was being taken over by another company kicked down with his foot a

thoroughly rotten piece of timber forming one of the four supports of a trestle bridge over which a train had passed only a few hours previously. Inadequate revenue from thinly-populated districts, depressed trade, bad management, reckless competition, and, too often, the dubious practices of certain groups of speculators, were among the causes that brought many of the lines into a state of bankruptcy. The holders of the mortgage bonds had power to foreclose on the railways unless they received the interest due; and, as a rule, either such foreclosure took place or some scheme of re-arrangement was carried out with the idea of putting the undertaking on a more secure basis. So it came about that from 1876 to 1901 the number of American railroads placed under receiverships was 638, representing a total of 114,348 miles and a sum of \$6,298,397,000 in stocks and shares. On June 30, 1894, no fewer than 192 American railways, representing nearly one-fourth of the total railway capitalisation of the United States, were in the hands of receivers. On June 30, 1901, the number had been reduced to 45, operating 2500 miles and representing \$49,000,000 capital stock, \$54,000,000 funded debt, and \$14,000,000 current liabilities.

The salvation of the United States' railways has been the enormous increase in the population and in the wealth of the country, especially during the last decade. What this increase has been like is sufficiently indicated by the following figures, which I take from

the Monthly Summary of Commerce and Finance in the United States :—

Year.	Population.	Wealth.
1850	23,191,876	\$7,135,780,000
1860	31,443,321	16,159,616,000
1870	38,558,371	30,068,518,000
1880	50,155,783	42,642,000,000
1890	62,622,250	65,037,091,000
1900	76,303,387	94,300,000,000 ¹

¹ Estimated.

As the general condition of the country thus advanced, the railway companies sought to improve their lines in general and to provide a larger type of rolling stock in order both to meet the growing demand for transport facilities (a demand so great at the present time that in some instances it is physically impossible to supply it), and to effect economies in the working. So it has come about that in their time of prosperity leading companies have spent enormous sums of money on "betterment" and improvement during the last few years, and much betterment and improvement—if not more or less actual reconstruction—is actively going on all over the United States. Yet, so far as permanent way is concerned, the vast sums which are being expended on betterment still leave most of the American railroads behind the perfect condition which a British

line of railway must be in before it is allowed by the Board of Trade to start operations ; and whereas one American railway magnate whom I consulted on this point declared that he did not suppose there was a single railroad in the United States which was "complete" in the sense in which (say) the London and North-Western Railway is complete—especially in regard to streets or thoroughfares not being crossed on the level,—another authority could only suggest, as a solitary exception to this rule, the seventy-five miles of road between New York and New Haven, on the New York, New Haven, and Hartford Railway. While, therefore, on the one hand, much is said about locomotives and cars in America of power or carrying capacity far in excess of anything to be found in England—and intended to deal with a freight traffic equally in excess of what is available here,—and while vast improvements are being carried out which will eventually add very greatly indeed to the value of American railways, on the other hand one finds lines that cross one another, or that pass along streets or thoroughfares on the level, lines imperfectly ballasted, and lines with trestle bridges, inadequate signalling arrangements, and primitive conditions generally, which would not be tolerated for a single day in the working of our own railways. Such conditions prevail more especially in the western States, but they are also found abundantly in the eastern States ; and many hundreds, if not thousands, of millions of dollars will

have to be spent before the work of betterment can be regarded as really complete.

There is thus a very great difference, to start with, between a British and an American railway. The one is a finished undertaking when it begins operations, the other was originally built in the most unpretending fashion, and was to be improved gradually according as the population increased, the traffic grew, and the finances permitted.¹

In providing for these improvements the American railways have followed no hard-and-fast rule, but have been guided, rather, by circumstances. Their leaning has been in favour of paying for betterment out of the

¹ On this point a railway official in America said to me :—"I was once making a tour through Scotland and I came to a wayside station put down at a place where there was not a single house in view for miles around. Yet the station was provided with first and third class waiting-rooms, telegraph office, over-bridge, and other such arrangements, and there was a staff composed of station master, porter, ticket collector, baggage man, and telegraph operator—just as though the station was going to do a big business. The buildings must have cost a substantial sum, but the takings at the station would hardly suffice, I should think, to pay one year's interest on the outlay, or even the wages of those employed to run the show. Here, in America, we should have put up a little wooden station that would cost only a small amount, we should trust to the people being able to cross to the other side without wanting an over-bridge, and we should leave the whole thing to be run by one man who would do everything. By-and-by, as the business improved, we should improve the station, but we should consider this quite sufficient to start with. It may be that your Board of Trade or some other of your authorities would not allow you to adopt our simple and inexpensive methods ; but it seems to me that in such a case as I mention your lines spend too much money in trying to secure an absolute perfection of their station equipment."

revenue of good years (the amount of betterment done is apt to fall off considerably when the earnings are poor), using, to this end, a substantial portion of the balance that may remain after they have paid their usual dividends; for American railways are, generally speaking, reluctant to increase a dividend unless there is some prospect that such increase is likely to be permanent. Others resort partly to this system and partly to the raising of new capital, either in shares or bonds, or both, most of the American railway companies having absolute authority in regard to the issue of fresh stock. The principle generally followed is that expenditure which adds to the earning power of the company shall be raised by fresh capital, while that which is spent on renewals, alterations, or improvements, without any increase of earning power, shall be met out of revenue. One or two illustrations of the course of procedure taken by leading companies may be of interest.

In the case of the Pennsylvania Railroad Company the net income for the year 1902, as shown by the annual report, was \$25,849,963. Of this sum \$12,262,491 was applied to the payment of a cash dividend of 6 per cent. The total amount of the expenditure during the year upon the main line between New York and Pittsburg and the branches operated therewith (including \$7,466,185 for equipment and shop tools and machinery) was \$25,874,276. Of this aggregate \$8,374,276 was charged to the capital

account, \$5,000,000 was supplied by a fund set aside in 1901, and \$12,500,000 was charged against the income of the year in respect to expenditure "in revision of grades and alignment, and for additional tracks, piers, yards, bridges, station and other terminal facilities, abolition of grade crossings, and increase of equipment." Additional expenditures upon the branch roads, amounting to \$5,341,630, were met by the several companies out of their own resources.

The New York Central and Hudson River Railroad Company spent in the year ended June 30, 1902, a total sum of \$12,962,502 on "renewals and improvements." Of the four items making up this total two were provided for from current income—namely, \$2,100,804 expended for additions to and replacements of equipment and improvements to roadway and structures, charged to operating expenses, and \$1,836,835 spent for the renewal and strengthening of bridges and for improvements to roadways out of special sums set aside for the purpose. The third item, \$4,714,257, for additions to the property, charged to cost of road and equipment, was met by fresh capital; and the fourth item, \$4,310,604, for new construction, equipment, and improvements on leased lines, was provided for by funds from companies whose lines are leased by the New York Central and Hudson River Company. The operations for the year showed a profit of \$8,016,717, and the surplus remaining after paying a dividend of 5 per cent was \$2,055,306. From this surplus \$1,750,000 was set

aside as a special fund for betterments to the property, and the balance was carried to the credit of income account.

On the Illinois Central Railroad the amount spent on betterment during the year ended June 30, 1902, was \$8,097,646. Of this sum \$268,412 was charged to betterment funds previously provided, and \$4,340,172 was defrayed from current income (the net income for the year being \$9,790,461), and the remaining \$3,489,062 was charged to capital, the directors having decided further to increase the capital stock from \$79,000,000 to \$95,000,000, by an issue of 158,400 new shares.

The Baltimore and Ohio Company have on hand construction and betterment works which will eventually cost about \$14,000,000. The amount actually spent under this head in the year ended June 30, 1902, was \$5,800,000; and of this \$3,300,000 was charged to new capital, and \$2,500,000 was appropriated out of the surplus income of the year. In the previous twelve months the expenditure for construction and betterment amounted to over \$9,000,000, of which \$2,500,000 was taken from earnings and \$6,500,000 raised by new capital. And so on with many other companies.

Happily for the American railways the leading lines find themselves in a period of unexampled prosperity, and are thus able to put aside substantial sums out of revenue for the purposes of improvements, while still maintaining—if not in some cases increasing—the

dividends and reducing their charges to their patrons. But when one remembers that, up to the present, the item in American railway expenditure which is entitled "Cost of road and equipment" averages only about one-quarter of the corresponding item in England, one sees how substantial an outlay must necessarily be incurred in the former country to bring the lines up to the same level of general excellence as is the case in Great Britain; and to the leaders in the American railway world it seems only fitting that they should take all possible advantage of the magnitude and profitable nature of their present traffic in order to effect changes and ameliorations which the circumstances even of six or eight years ago might not then have rendered necessary, but which are most desirable, if not absolutely necessary, now. The whole story of the American railways has been one of gradual growth according to the exigencies of the time; and for this very reason they are, in a sense, better able to adapt themselves to the conditions of to-day than would be the case if, years ago, they had been compelled to attain to a fixed standard of perfection according to the ideas which then prevailed.

If, however, the British railways have cost much more to construct and operate, and if they have been hampered and fettered by Parliamentary and official action to an extent unknown in America, they have, nevertheless, enjoyed a fixity of tenure far greater than has been the case on the other side of the Atlantic. In the course of conversation on this point, a gentleman

of great influence in the American railway world said :—

I read in one of your English papers some years ago that English railways had to spend at the rate of £2000 a mile on Parliamentary proceedings. It is a big sum, but I have come to the conclusion that it is money well laid out, and for this reason. Here in the United States it is a comparatively cheap thing to set up a railway. Each State regulates its own railway matters, but it is the exception rather than the rule for the promoters of a new line of railway to have to get official sanction for their scheme at all. In Pennsylvania, for instance, anybody who cares to form a company, and can raise the necessary money, is at liberty to start a railway. So it has happened hundreds of times that when one company has made a line, and has some chance of success, another will construct one almost parallel with it, either legitimately, in the belief that there is room for two, or for the express purpose of compelling the first company to buy it out. In the latter case the competing line may have been made in the cheapest possible way, but, all the same, it represents a factor which cannot be ignored. Sometimes the result has been a war of freights, in which the older company has so undermined the position of the younger that the latter has been glad to sell out on the best terms it could get. Not the slightest consideration will have been shown by the competing line for the rights of the original investors. One effect of this policy, and of the "cutting" of rates to which it led, has been to encourage the grouping of a number of individual companies into great and powerful "systems," which, in addition to being better able to regulate freight tariffs, would be less amenable to attack by unscrupulous specu-

lators. Ordinary motives of self-defence made it necessary, in fact, that leading companies which desired to maintain their position should either amalgamate more or less with other lines operating in a certain territory, or else buy up as many shares as possible in such companies, so as to get the control. Another outcome of the situation was the creation of a class of individuals known as railway lobbyists,—men who were on the pay roll of the railway companies, and whose duty it was to be in the lobby, either at Washington or in the State Legislatures, so as to keep in touch with everything going on that might possibly prejudice the welfare of the railway they represented, and to adopt measures—on the lines peculiar to American politics—to secure the influence of members either for or against particular schemes, as the case might be. Although, therefore, your English railways have cost more to build, and although they are subject to strict Parliamentary procedure, and to so much Government control in general, they, nevertheless, represent a far greater security of interest than is the case in the United States, where things have been done that your Imperial Government would certainly never tolerate. But the position in America has greatly improved of late years, and the improvement has been brought about in a way that constitutes a tremendously important factor in the railway situation of to-day. It began with the leaders of the railway interest finding that they were not merely the representatives of a great private enterprise, but were responsible for a great public trust, and, also, that higher obligations had been put upon them than were represented merely by the making of profits for their bond or shareholders. But the individuals who controlled the situation, and really brought about the improvement I speak of, were the financiers. Their help, of course, was necessary

before the bonds for the "wild cat" or competing lines could be put on the market. Most of them, however, were already interested more or less in existing lines, and not only were they personally concerned in maintaining the value of the securities in those lines, but they thought it desirable that the railways of the country generally should be put on a more solid foundation than was formerly the case. So it happens that in late years one railway project after another has been rejected in Wall Street because the financiers would not look at it. Without Federal control, therefore, the situation in America has adjusted itself to the exigencies of ordinary business considerations. We have learnt our lessons, and now, on the one hand, we are profiting by experience, and, on the other, we are taking advantage of our opportunities. The present wave of prosperity may not last. But, even if it recedes somewhat, we shall have been carried forward much further than we were before; and, in the meantime, we shall have spent on the improvement of our lines a big sum of money out of what we can well afford to set aside from our earnings in these last few years of exceptional prosperity. But what is being done now is on a solid, and not on a merely temporary, basis. We have got past the stage of having to do things on the cheap, according to comparatively small requirements, and advancing only a step at a time. To-day we have to meet great demands for traffic facilities, and we must act on a big scale, spending money the more freely because we have not only to provide for new wants, but also to do many things which your English railways would have started with, but which the American lines very wisely left over until they had improved their position, and had just such means as they now find themselves able to command.

II

SOME POINTS OF DIFFERENCE

COMPARING the statistics of American railways with those of railways in the United Kingdom, one gets some striking points of difference. In the United States the total length of railroad, exclusive of sidings, in the fiscal year ending June 30, 1901, was 195,886, of which only 7·5 per cent, say 14,874 miles, was more than single track. Reduced to miles of single track the length of railway was 210,435 miles. In the United Kingdom for the year ending December 31, 1901, the total length of road, exclusive of sidings, was 22,078, of which 55·8 per cent, say 12,272 miles, was more than single track. Reduced to miles of single track the length of railway was 35,993 miles. The growth of railways in the United States is shown by the fact that in 1832 the mileage was only 229 ; in 1835, 1098 ; in 1839, 2000 ; in 1842, 4000 ; and in 1846, 5000. It doubled by 1851, doubled again by 1856, reached 30,000 in 1860, and doubled this figure eleven years later. By 1881 the total was 103,000, by 1891 it was

170,000, and in 1900 it was 194,000. In June 1902 the figure stood at 201,839 miles.

The longest railway system under the control of a single company in Great Britain is the Great Western, which represents 2656 miles. The next longest is the London and North-Western with 1937 miles, and this is followed by the North-Eastern with 1654 miles, the Midland with 1441, and the Great Eastern with 1109 miles. But in the United States the Pennsylvania Railroad Company and the New York Central and Hudson River Railroad Company each control over 10,000 miles of railways. There are 28 systems which own and control over 2000 miles each, and 49 which operate a mileage of over 1000 each. These figures are almost sufficient in themselves to suggest how impossible it is to carry out any real comparison between systems which differ so materially in their dimensions.

The total capital of the railway companies of the United States in 1901 was £2,337,635,598, — say £11,933 per mile of road, or £11,108 per mile of single track. In the United Kingdom the total capital of the railway companies in 1901, after allowing for nominal additions, was £1,008,107,000,—say £45,661 per mile, or £28,008 per mile of single track.

The equipment of the companies in the two countries in 1901 may be contrasted as follows :—

[TABLE

	United States.	United Kingdom.
Locomotives owned	39,727	21,714
Passenger vehicles	35,811	67,916
Freight vehicles	1,409,472	698,000
PER 100 MILES OF RAILROAD—		
Locomotives owned	20	98
Passenger vehicles	18	307
Freight vehicles	719	3,161
PER 100 MILES OF SINGLE TRACK—		
Locomotives owned	18	60
Passenger vehicles	17	188
Freight vehicles	669	1,938

These figures bring out into strong relief the greater equipment of the English over the American lines.

No less interesting are the following comparisons in regard to passengers and freight carried and the receipts therefrom :—

PASSENGERS

	United States.	United Kingdom.
Passengers carried	600,485,790	1,174,275,036
Passengers carried per mile of railroad	3,098	53,187
Passengers carried per mile of single track	2,853	32,625
Train mileage (passenger)	391,543,708	224,051,899
Total receipts from passengers . .	£72,140,537	£46,629,865 ¹
Receipts from passengers per mile of railroad	£352	£2122
Receipts from passengers per mile of single track	£342	£1295
Receipts per passenger train mile .	3s. 8d.	4s. 1½d.
Receipts per passenger	28s. 8d.	9½d.

¹ This includes about 7½ millions received in respect of excess luggage, parcels, carriages, horses, dogs, and mails.

FREIGHT

	United States.	United Kingdom.
Tons carried	1,084,066,451	415,935,441
Tons carried per mile of railroad	5,575	18,840
Tons carried per mile of single track	5,151	11,556
Train mileage (freight)	505,468,619	173,062,389
Total receipts from freight	£225,253,000	£52,965,569 ¹
Receipts per freight train mile	8s. 10·9d.	6s. 1·4d.
Receipts (freight) per mile of railroad	£1158	£2399
Receipts (freight) per mile of single track	£1070	£1471
Receipts per ton	4s. 1·8d.	2s. 6·5d.

¹ This includes £1,355,303 for carriage of live stock.

The reader will see from these figures that whereas the mileage of the American railways is greatly in excess of that of the British railways, the density of passenger traffic is far greater in the United Kingdom than in the United States; while in the United States the receipts from freight traffic represent a far larger proportion of the entire revenue than is the case in the United Kingdom.

It had not been possible, at the time of writing, to get for the United States the complete returns for 1901 showing the payments made for maintenance of way and of equipment out of revenue, and consequently the following comparison of the respective expenditures on this account are based on the figures for 1900 :—

[TABLE

	United States.	United Kingdom.
Maintenance of way	£42,244,000	£9,540,554
„ „ equipment	36,234,600	5,173,716
	£78,478,600	£14,714,270
Amount spent per mile of railroad .	£407	£673
„ „ „ track .	£379	£412

Here we see that the British railways spend more out of revenue per mile for maintenance of way and maintenance of equipment than the American, notwithstanding the fact that the former start in a far more perfect condition than the latter.

A complete comparison between the taxation of railways in the two countries is practically impossible, because in the United States every State has its own method of taxing, and the variations adopted render the general position almost chaotic. But, taking the broad results, one gets the following figures :—

United States—

Total sum paid in taxes £10,188,874
 Say £3·06 per cent of gross receipts.
 Showing £52 per mile of railroad,
 or £48 per mile of single track.

United Kingdom—

Rates and taxes £3,979,490
 Government duty 354,184
 £4,333,674

Say £4·06 per cent of gross receipts.
 Showing £196 per mile of railroad,
 or £120 per mile of single track.

The proportion of working expenses to receipts may be shown thus :—

	United States.	United Kingdom.
Gross earnings	£332,500,000	£106,558,000
Net „	£104,059,000	£39,069,000
Percentage of gross earnings to working expenses .	69·01	63

One point that tells in favour of the American railways in this matter of working expenses is their comparatively smaller number of *employés*, the total per 100 miles of line being 548 in the United States, as against 2635 in the United Kingdom. In the former country the laying of the track is a much simpler affair than with ourselves ; the fact that luggage is handled chiefly by transfer and express companies renders unnecessary the employment of large staffs of porters at terminal or other important stations, and also of large numbers of stablemen, drivers, etc. ; while American railway companies, with a few exceptions, do not make their own locomotives, cars, and waggons, as is mostly the case in the United Kingdom.

I conclude this series of tables with the following, which gives the net return on capital of American and British railways :—

<i>United States—</i>	
Total capital	£2,337,635,598
Net earnings	104,059,000
Say £4·45 per cent, or £4 : 9s. per cent.	

United Kingdom—

Total capital (after allowing for nominal additions)	£1,008,107,000
Net earnings	39,069,000
Say £3·87 per cent, or £3 : 17 : 4½ per cent.	

In comparing the respective returns on capital in the two countries, it should be borne in mind that the United States railroads now benefit from the wholesale reorganisations of capital which have been effected since 1894, as indicated by the figures I have already given showing the reduction in the number of receiver-ships between 1894 and 1901.

Further, it should be remembered that 1901 was probably by far the best year that American railways ever had, and that it was certainly one of the worst years in the history of British railways. Thus, comparing 1901 with 1899—a more normal but by no means specially favourable year—coal alone accounted for an increase of £2,898,000 in the working expenses of British railways, after allowing for the difference in the number of train miles run in the two years. In fact, but for this altogether abnormal increase in the price of coal, the net profits of British railways for the year 1901 would have been increased to £41,967,000, yielding £4·16 per cent, or (say) £4 : 3 : 2½ per cent.

Again, if rates and taxes had only increased since 1891 in the same proportion as the gross receipts (say 30 per cent), the amount payable under that head would have been only £2,919,000 instead of £3,979,000, a saving of £1,060,000, which would have increased the

net receipts for the year 1901 to £42,027,000, yielding £4·26 per cent, or (say) £4 : 5 : 2½ per cent.

The amount of capital stock in the American railways paying no dividend at all, on June 30, 1901, was \$2,829,021,925, or 48·73 per cent of the total amount then outstanding. Omitting equipment trust obligations, the amount of funded debt which paid no interest was \$361,905,203. Of the stock paying dividends 8·82 per cent of the total amount outstanding paid from 1 to 4 per cent, 13·37 paid from 4 to 5 per cent, 10·47 paid from 5 to 6 per cent, 8·71 paid from 6 to 7 per cent, and 6·67 paid from 7 to 8 per cent. The amount of dividends declared during the year was \$156,735,784, which was equivalent to a dividend of 5·26 per cent on the amount of stock on which some dividend was declared. It is, however, only during the last year or two that certain of these companies which now pay dividends, especially in the western States, have been able to show any profits at all. The effect of increased prosperity on the American railways generally, however, is shown by the fact that for the year ended June 30, 1902, the dividends of essentially the same operating roads were greater by nearly \$30,000,000 than for the previous financial year.

But, apart from statistics, which may be capable of various readings or modifications, the fundamental differences between the two systems of railways are not fully realised until one has actually travelled in both countries. The size, beauty, and general arrangements

of the terminal stations of the great American lines impress the newly-arrived traveller from Europe most favourably ; and when he takes his seat in a Pullman car to begin (as in my case) a journey across the American continent, he may think that he has reached a country which represents the highest type of railway development. But he will not have got many miles from his starting-point before he revises his judgment ; and long before he arrives at (say) Pittsburg he is completely undeceived as regards even the eastern conditions, which, he is assured, are much more advanced than those to be found in the western States. Not only, in fact, have the American railways been started with such primitive methods as those referred to in the previous chapter, but these primitive circumstances still, in fact, mainly prevail. One gets the curious impression that the American railways are both in advance of their times and one or two decades behind them. At one moment the traveller observes on the adjoining track locomotives and freight cars far surpassing in size and capacity anything he will have found in Europe, and at another he will see the rails he is on cross at right angles the rails of another line ; he will find his train passing along the streets of towns and villages ; and he will see country roads, and even the main street of some fairly populous place, go right across the track, sometimes, it may be, guarded by a man with a flag, protected by a pole raised or lowered by a lever, or having at one side the caution, "Beware of the loco-

motive," though in scores of instances between New York and Pittsburg I noticed that the level crossings had absolutely no protection at all, and pedestrians, cyclists, and the drivers of carts, carriages, and even of tramcars had simply to take care of themselves as they crossed the lines, and keep as best they could out of the way of the passing trains. True it is that the train often slowed down, and that the locomotive bell was kept ringing, when the streets were passed through; but that was all. The train seemed, in fact, to be regarded as little more than a tramcar, and not much notice was taken of it; but to a visitor accustomed to the protection afforded to the public in England against possible injury from passing trains the whole thing gave the impression of being dangerous in the extreme. Yet this was on a line of railway which deservedly ranks among the very best in the United States for its advanced ideas and progressive policy, and which, in the matter of signalling, for instance, is claimed, on certain sections of its system, to be distinctly in advance of anything to be found in Europe.

There is indeed an odd admixture of the crude and the perfect that strikes one in the working of American railways; but in no respect are they more behindhand than in this matter of "grade" crossings. At York, a populous Pennsylvanian city, where the train passed down the centre of an extremely narrow street before it reached the railway station, there seemed to be something peculiarly appropriate in the injunction which

with British railways—there are none. They are represented in an American railway station (other than a terminus) by some planks, which are either on the same level as the rails or about a foot above them. All the carriages being of the corridor type, one enters them by means of the steps at either end of the car, so that, in point of fact, the raised platform can be more readily dispensed with as regards cars of this description than would be possible with our own. But what is much worse is the absence of over-bridges or subways to enable passengers to cross safely to the other side of the station. If a train draws up on the rails farthest away from the station exit the traveller must walk over the other rails, dodging any incoming train or stray locomotive as best he can until he gets to the main platform. True it is that any train or locomotive passing through or entering a large station must ring its bell to warn people to get out of the way, but the monotonous “clang, clang, clang” of the bell rather adds to the confusion than otherwise. At Altoona a long train of Pullman coaches was between the train in which I arrived and the way out. After clambering down the steps of the cars I was in, I had to mount the steps of one of the Pullman cars, and then go down again on the other side in order to cross the lines. As the steps were covered with frozen snow it was not very pleasant to have to go through this acrobatic performance in the gloom of a November evening, with some hand baggage to look after as well; and, altogether, I should say that the critics who wish to

introduce American methods into the working of English railways would probably draw the line at having to undergo such experiences as these. The wayside stations are mostly wooden pavilions, which are of the smallest dimensions compatible with the business to be done, and have evidently been run up in the cheapest possible form. Occasionally they expand into fairly substantial brick buildings; but, as a rule, they suggest an English cricket tent, or a rustic summer-house, with some boards laid down on each side, surmounted by a roof as a protection against rain.

Except, therefore, where the most advanced type of "modern improvements" have been introduced into the American railroads, everything about them represents a much lower standard of completeness than has been secured by the English lines. Far, however, from seeking to deny this fact, American railway men are inclined rather to pride themselves upon it. Their policy has been a policy of essentials. It was essential for a railway to have three things—a line of rails, a locomotive, and some cars. It might be desirable, but it was not absolutely essential, as regards the working of the line, to prevent people from being killed. So the railway companies put down, in the roughest form, just what was wanted for the time being, and nothing more; and they left humanitarian considerations on one side until they were successful and prosperous enough to do bigger things and to indulge in the luxury of surplus emotions. The British system, they say, may suit a small, settled,

and thickly populated country like Great Britain, but they honestly believe that the American method of beginning in an unpretending style, and effecting betterments later on, suits a young country like America far better than English methods would. While admitting that there is good reason for this view, the friendly critic might suggest that some of the betterments really ought to have been carried out years ago, and that the safety of the public, especially in the populous districts of the eastern States, has been too long endangered by the numerous level crossings, the absence of over-bridges at railway stations, and the various other risks and perils which have grown up with the American railway system. To this the reply given is that only within the last few years have the American lines, taken as a whole, had the means to start on their extremely costly improvements, the necessity for which is frankly admitted. In any case it is gratifying to know that the work of betterment is now in full swing on many of the lines, which often present, indeed, such a scene of activity as suggests alterations amounting almost to reconstruction.

III

THE GROWTH OF FREIGHT

THE predominant factor of the railway situation in the United States to-day is the enormous increase in the freight business. The resources of the country are being developed at a greater rate than the facilities of the railway companies for dealing with them, and there are leading railway officials who confess that the problem before them is, for the time being, not so much one of actually grappling with the demand of the American public for freight facilities as of even keeping pace with them. At Chicago the Illinois Central Railroad Company put up ten years ago, at a cost of \$2,000,000, a new railway station with general offices which they thought would provide all necessary accommodation for fifty years. Such, however, is the growth and pressure of business that not only have the company had to order the raising of an annexe to the offices, but I saw the novel spectacle of six storeys of this new building being in full occupation by officials and clerks, while the seventh storey was not yet ready for occupation ; the



eighth storey was represented by bare walls and windows, the ninth storey by walls and no windows, and the tenth storey by steel girders, the roof being still non-existent.

The conditions which have led to this situation in regard to traffic form a matter that is well deserving of study, inasmuch as nothing analogous to them is to be found in Great Britain ; and in the first place reference should be made to the expansion of agricultural interests in the United States.

It is not so many decades ago since the grain-producing centres of America were to be found in the States of New York and Pennsylvania, while at one period it was mainly to New England that the young country looked for her manufactures. But, as time went on, the westward trend of the population was followed by the pushing of agriculture out of New York State and Pennsylvania by the industries which took its place, and one western State after another became the scene of agricultural activity, so that to-day America counts as essentially an agricultural country, and the one from which the world in general draws a substantial portion of its food supplies. But the earliest pioneers in this movement were mostly poor men, and, though they got free grants of land, or grants on the easiest of terms, they wanted money for its development. Thus the wave of migration, preceded, as a rule, by the railways that were stretched across the then undeveloped prairies, was followed by the establishment of

numerous banks which supplied the settlers with the means they required, advancing money on mortgages which are now being rapidly paid off. As for the railways, if they built more or less in faith, they, too, are now getting their reward, for it is to the prodigious expansion of the agricultural resources of the United States that the difficulties experienced there by the railways in dealing with the mass of freight traffic are mainly due. What has happened is that the increased volume of agricultural products going from the west to the east or to the south has not only been great in itself, but has been succeeded by a return flow of manufactured commodities from east to west. That is to say, the agriculturists who have prospered so well find themselves possessed of the means for satisfying wants or indulging in luxuries with which in days gone by they had to dispense. Pianos, for instance, of the best make are going to out-of-the-way spots in North or South Dakota at a rate altogether unprecedented. The farmers are buying also more costly furniture for their homes and more and better clothing for their families, and the springless farm waggons, which had already constituted an advance on riding on horseback, are now being succeeded by the best buggies or the choicest of closed carriages that the eastern States can produce. Then the farmer has taken to burning anthracite coal in preference to bituminous, and in many other ways he is getting increased advantages in exchange for his greater wealth. The expanding of towns, the provision of a

better type of houses in those towns, the setting up of industries, the transportation of machinery for farm, factory, or workshop, and the thousand and one other needs of a population growing both in dimensions and wealth, all add to the volume of railway consignments, and help to explain why it is that the agricultural commodities from the west have been getting almost hopelessly mixed up with the manufactured products from the east. It is true that, as against all this, there has been a marked expansion of industrial enterprise in the western States, so that the needs of the dwellers there may be supplied locally instead of from eastern centres. At one time, for instance, it was the practice for raw materials to be sent from the western States to Massachusetts, the manufactured articles being thence returned to the west. But now the west is manufacturing more and more for itself. Boots are even being sent from Chicago to Boston, which at one time was regarded as the capital of the boot and shoe industry of the United States. The industrial development of the western States is, in fact, gradually covering nearly all articles of manufacture, rendering those States more and more independent of the east, though the latter is still supreme in the matter of textile fabrics. But though, on the surface, there might seem to be the possibility of a falling off in the amount of freight going westward, the railway companies have no fears on the subject, believing, as they do, that with the increase of population any reduction in the demand for one class of

commodities is certain to be counterbalanced by an increase in another.

No less striking than the facts just narrated are the circumstances in which the agricultural community in these western States carry on the pursuits which have brought to them the greater measure of prosperity they are now enjoying. With regard to wheat, one crop is sown in the autumn in south Kansas, south Illinois, and along the corresponding isothermal lines, and is reaped in June or July ; and in the spring there is a crop sown in Dakota, Nebraska, and northern Kansas, and harvested in the autumn. The farmer is put to no trouble to find a market for this wheat. All he has to do is to take it to the nearest railway station, where there will be from one to perhaps three or four grain elevators, each capable of containing between 10,000 and 50,000 bushels of grain, and belonging to some individual or company to whom he can sell his entire crop right off, returning home with the money in his pocket. The wheat will be added to the stock in the elevators, and thence, when a sufficient quantity has been accumulated, it will be run off into a complete train of wheat cars. There are various "gateways" through which the grain is distributed, but much of it is taken to Chicago, where it is removed from the cars to elevators of far greater dimensions than those in the country districts, and capable of holding, in fact, any quantity up to 5,000,000 bushels each, the total capacity of the whole of the Chicago elevator warehouses in 1901

being equal to 28,150,000 bushels. From these elevators the wheat will in due course be turned into steamers, which (except when the navigation is stopped by ice) convey it by the network of lakes to Buffalo. Other large consignments reach the same point from the north-western States *via* Duluth, on Lake Superior. The wheat that passed through the Duluth-Superior harbour in the calendar year 1902 represented a total of 41,000,000 bushels, this being in addition to 8,000,000 bushels of other grains, 7,000,000 barrels of flour, and 12,000,000 bushels of flax. The whole growth of business at the Duluth-Superior harbour (where the navigation season averages only about eight months per annum) has been remarkable. The total vessel freight arriving and departing in 1902 was 17,500,000 tons (of 2000 lbs.), valued at \$194,000,000, this being an increase of 35 per cent in the freight tonnage on the total for 1901, and an increase of 515 per cent since 1890.

At Buffalo there is a further transfer to elevators, and such is the magnitude of the business that at the end of November 1902, just before the close of the navigation season on the lakes, the New York Central and Hudson River Railroad Company had 5,000,000 bushels of grain in their Buffalo elevators awaiting transport, and were daily receiving larger quantities than they could send off, although they were despatching four grain trains every day, each train consisting of, say, seventy waggons, and each waggon holding about

1100 bushels of grain, or a total of 77,000 bushels per train. It is traffic such as this that helps one to understand why it is that the American railway companies have had to resort to such large freight cars and such powerful locomotives! The rate charged by the New York Central and Hudson River Company for the conveyance of the grain at the date mentioned was equal to about 2½d. for each 60 lbs. carried between Buffalo and New York, a distance of 440 miles. So low a rate as this is only made possible, of course, by the carrying of such large quantities for such considerable distances.

Much more important, however, to the American farmer is the cultivation of maize, as it is called in Great Britain, or corn, as it is called in the United States; and the special importance of this commodity is due to the extent to which it is being used as a feeding stuff for live stock. In other words, the American farmer has found that it pays him much better to feed cattle and hogs with his corn than to send it to market in its natural form, and the railway companies find that, although under this system they convey less maize, they nevertheless carry, first of all, far more live stock, and, secondly, a vast amount of meat products. The growth of this industry represents, indeed, one of the most interesting phases alike of agricultural development and of railway progress in the America of to-day.

The original stock of cattle in the United States

was of good English breed, but in course of time there were many importations from Mexico, and a marked deterioration in quality followed. The cattle were mostly grass fed on ranches. Many of the western ranches still contain 100,000 acres. There is one in Texas, owned by the Capital Syndicate, which comprises 3,000,000 acres, and there is another, owned by a lady, which extends over 2,000,000 acres. The cattle thus had plenty of space to wander over, but the feed was comparatively poor, and they remained of the same indifferent quality. Then the habit crept in more and more of removing them from Texas to the great maize-growing district comprised by the States of Kansas, Missouri, Nebraska, Iowa, Minnesota, Illinois, Wisconsin, Michigan, Indiana, and Ohio; but the method of feeding the cattle was most primitive and wasteful. They were turned loose among the crops, being left to feed themselves, followed by troops of hogs. Then a new era set in. Pure bred animals were introduced from Great Britain, and the stock they produced was sent into the south-western States, and especially into Texas, where the breeding of cattle was conducted on a most extensive scale.

Experience showed, however, that while the cattle were more prolific in the south, they fattened much better in the north, and with the increasing tendency in the United States for the specialisation of industries, the Texans kept to the breeding of cattle, while the northerners bought the yearlings, took them into the

maize-belt region, and there fed them until they were fit for market. A single feeder has been known to buy as many as 17,000 yearlings in a single season. The farmers mostly fed the cattle on maize which they grew themselves, buying from other sources if their own supply should be insufficient, or, in that case, selling the cattle again to people in States where the crops were plentiful. Then the farmers improved upon their original methods. They employed machinery which cut the maize and bound it into sheaves, and they afterwards reduced stock and ears to a kind of chaff mixture, which the cutting machine, by reason of the current it created, owing to a special contrivance, blew direct into a silo, the mould subsequently forming on the top being a complete protection against the weather. In this way a much greater economy in the use of the maize was practised, and not only did the crops go further, but a good supply of food was secured for the winter. Then, as the farmers—who have been greatly helped in this matter by the agricultural colleges set up by various States—learned the benefits to be derived both from securing the fullest advantage from fertilising agents and from following a rotation of crops, they obtained far better results from their labours. Larger holdings were taken over, more, and still more, animals were secured, and the business was greatly developed. In the south-west, too, the tendency towards expansion in the breeding of cattle has been greatly encouraged by the splitting up of the

large ranches into a series of smaller ones, thus bringing many more people into the business, while smaller herds are receiving a degree of care and attention which is contributing to their improved quality. In the south-west the ranches where the cattle are bred will now be from about 3600 to many thousands of acres in extent, and in Illinois, Iowa, and elsewhere the cattle are fed on farms ranging from 160 to 2000 acres.

The ultimate destination of most of the cattle thus bred in the south-west and fed in the north-west is, first, the stock yard, and then the slaughter-house of the packer, and the same is the case with vast numbers of swine and sheep, of which the former come mostly from Illinois, Missouri, and Nebraska, and the latter chiefly from Montana, Wyoming, and New Mexico. The magnitude of the business done at these live stock markets is shown by the fact that in 1901 the Chicago Union Stock Yard received 3,213,000 cattle, 8,900,000 swine, and 4,044,000 sheep; the Kansas City Stock Yard had 2,126,000 cattle, 3,716,000 swine, and 980,000 sheep; and Omaha had 818,000 cattle, 2,214,000 swine, and 1,314,000 sheep. In the case of Chicago alone the value of the animals that passed through the stock yards in the course of 1901 was \$300,000,000. At these stock yards the different packers have more or less extensive premises where most of the animals bought in the open market are slaughtered, and whence the meat products—and the countless by-products

besides, practically nothing being wasted—are distributed to all parts, not only of America, but of the civilised globe. A single company at the Chicago Stock Yard despatches by rail 250 waggon-loads of meat and other things every day, the average weight per car (allowing for the space taken by the carcasses of fresh meat hung in the refrigerator cars) being 15 tons.

Practically the whole of this vast business is hauled by the railway companies. They bring the live animals to the stock yards from distances ranging from 100 to 1500 or 2000 miles, and they take away the greater portion of the meat and other supplies into which the live stock is converted. In addition to this they handle the barrels, salt, ice, and other things needed for the various processes. No fewer than twenty-one railways having roads into Chicago deliver or take away consignments, the total number of cars delivering at the stock yard in 1901 being 291,741 (an increase of 14,536 over 1900), and the number taking away consignments, 75,355 (an increase of 4270). A single railway company, the Chicago and North-Western, delivered at the Chicago Stock Yard in the course of the year 1901 no fewer than 692,282 cattle, 45,349 calves, 1,910,821 swine, 1,043,747 sheep, and 17,526 horses.

As regards the carriage of maize, although the railways handle only, as it were, the residuum of the crop—the great bulk of it being used for the raising of live stock—the quantity brought into Chicago by rail in 1901—

without reckoning what passed through other "gateways"—was 84,523,000 bushels, a substantial reduction on the figure for 1901, when the total was over 134,600,000 bushels. Of that dealt with in 1901, the Chicago, Burlington, and Quincy Railroad carried 15,800,000 bushels; the Illinois Central, 13,600,000; the Elgin, Joliet, and Eastern, 10,700,000; the Chicago, Milwaukee, and St. Paul, 9,600,000; the North-Western, 6,100,000; and the Chicago and Alton, 4,200,000.

As further illustrating the quantities of freight handled by the American railway companies, I may say that there were received at Chicago during 1901 90,600,000 bushels of oats, and of this total the Chicago, Milwaukee, Burlington, and Quincy Railway brought in 16,500,000 bushels; the Chicago, Milwaukee, and St. Paul, 15,600,000 bushels; the Illinois Central, 13,500,000; the Chicago, Rock Island, and Pacific, 12,600,000; and the Chicago and North-Western, 10,900,000. Of the total quantities of oats despatched from Chicago during the year, the great eastern trunk lines carried 58,000,000 bushels, while the quantities shipped *via* the great lakes aggregated 15,000,000 bushels.

As regards the amount of freight which may be dealt with over an individual railway system in the course of a single year, it may suffice to quote the following from among the figures given in the traffic statistics of the New York Central and Hudson River Railroad Company for the year ended June 1902:—

Grain moved, 2,500,000 tons (of 2000 lbs. each); flour, 1,147,000 tons; other mill products, 784,000 tons; hay, 600,000 tons; fruit and vegetables, 600,000 tons; live stock, 1,131,000 tons; dressed meats, 450,000 tons; other packing-house products, 546,000 tons; anthracite coal, 3,397,000 tons; bituminous coal, 7,766,000 tons; ores, 762,000 tons; coke, 504,000 tons; stone, sand, etc., 1,359,000 tons; merchandise, 3,425,000 tons. The total amount of freight handled by the company during the year was 35,599,000 tons.

The facts and figures given above indicate somewhat the growth of the railway freight as a whole, and the volume thereof which individual companies may handle. As regards the distances over which such freight is carried, I find from the report of the Interstate Commerce Commission for 1901 that the "typical haul of the average railway" in America is 124.89 miles. This figure, however, would naturally include a large amount of suburban traffic, as well as such a haul as that from New York to San Francisco, or *vice versa*. In the case of the Illinois Central Railroad the average haul is 233 miles, which includes, on the one hand, many very short hauls in and around Chicago, and, on the other, hauls of 1013 miles from the southern States.

It is the combination in the United States of these two factors of big loads and long hauls, with the addition of many special and complicated conditions besides, that renders it hopeless to make any real comparison between English and American rates. One of the most skilled

of American freight agents confessed to me that the whole position there in regard to freights was complex in the extreme. Most other things connected with railways had, he said, been reduced to scientific principles, but in the matter of freights no scientific basis seemed possible, owing to the infinity of differences and distinctions, and the whole position was one of chaos. "It's enough," he declared, "to make a man take to drink."

With the view of arriving, if possible, at some data on which comparisons with English conditions could be made, I asked another freight expert what would be the charges of his company for the carriage of, say, 15-ton lots of certain commodities for a distance of 35 miles. His reply was:—

"Oh, we don't worry ourselves much about such business as that. We must take most of our freight an average of 50 miles at least before we can consider that we have paid expenses. I would rather carry from 10 to 40 tons of freight a distance of 1500 miles for half a cent per ton per mile than I would carry it 50 miles for five cents per ton per mile. When once the freight is in the car, the ratio of expense is not in proportion to the distance carried. Our rates for the second 100 miles are less than those for the first 100; for the third they are less than for the second; and so we go on until when you get to the fifth or sixth 100 miles the difference is little more than nominal. That is the way our average keeps so low as compared with yours."

After this I spoke to still another expert on the subject, and showed him a circular issued by a certain English railway company offering to farmers reduced rates for the carriage of their produce when the goods were sent under such conditions that six tons could be loaded into an ordinary goods truck. I wanted the corresponding figures for his own line, and he was good enough to spend more time in trying to work them out than, as a busy man, he ought to have spared. He gave it up at last, declaring that any table of figures which pretended to give such statistics would be altogether misleading, because so many different conditions would have to be taken into account. "But, speaking generally," he said, "I should say that, though for long distances our rates work out distinctly lower than yours, the rates given on this circular are very reasonable, and are lower than we should ask if we rendered the same services, and especially the same terminal services, as the English company would do in carrying small quantities for short distances."

And that was as far as I could get with my attempt to draw up a table of really comparative freight charges.

The growth of the freight carried on the American railways as a whole is indicated by the following table :—

[TABLE
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Year.	Length of Railways in operation.	Freight carried.	Freight Earnings.		
			Gross Amount.	Average Receipts per ton per mile.	Average Receipts per mile of railway.
	Miles.	Tons.	\$	Cents.	\$
1889	153,680	619,165,630	665,962,331	0·970	4333
1890	157,976	691,344,437	734,821,733	0·927	4651
1891	164,262	704,398,609	754,185,910	0·929	4591
1892	170,607	730,605,011	794,528,500	0·941	4657
1893	173,361	757,464,480	808,494,668	0·893	4663
1894	176,221	674,714,747	700,477,409	0·864	3975
1895	179,154	755,799,883	743,784,451	0·839	4151
1896	180,891	773,868,716	770,424,013	0·821	4259
1897	181,065	788,385,448	780,351,936	0·797	4310
1898	184,117	912,973,833	868,924,526	0·758	4719
1899	186,224	975,789,941	922,438,314	0·726	4953
1900	191,455	1,071,431,919	1,052,835,811	0·746	5499
1901	194,455	1,084,066,451	1,126,287,652	0·756	5792

IV

WAGGONS AND LOCOMOTIVES

BETWEEN those earliest days in the history of the American railways when everything was in the most primitive condition and the great developments of freight traffic of recent years there was a period of steady progress when the companies applied themselves to a solution of the problem how the increasing traffic could be handled most expeditiously and at the same time most economically. This problem is as constantly in the mind of a responsible American railway official as is that of the way in which the actual business done can be expanded; and he finds it to be a matter of the greatest importance, because he may have to meet the competition not only of other lines more advantageously situated than his own, but, in the case of wheat, for example, of railways in foreign lands, so that a very slight difference in the cost of transportation may mean the securing or the loss of so much business in the markets of the world.

One of the various suggestions towards the cutting

down of the working expenses was that the railway waggons should be increased in size in order to reduce the proportion of dead-weight carried. But the change to the present dimensions has represented a gradual rather than a sudden development. Twenty-five years ago the average freight box waggon in the United States had a capacity ranging from 16,000 lbs. up to 24,000 lbs., a total outside length of 28 ft. $1\frac{3}{4}$ in., and an outside width of 8 ft. $7\frac{3}{4}$ in. Then, in 1881, the 40,000 lb. waggon was introduced, with a total length of 34 ft. $8\frac{3}{4}$ in., and a width increased to 9 ft. $0\frac{3}{4}$ in.; this being followed, in 1885, by the 60,000 lb. waggon, with, eventually, a total length of 36 ft. $8\frac{3}{4}$ in., and a total width of 9 ft. $0\frac{3}{4}$ in. After this came, in 1898, a waggon which, though no larger than its predecessors, was so constructed as to have a capacity of 80,000 lbs. To-day box waggons are being extensively made with a capacity of 100,000 lbs. In the same way the capacity of the gondola waggons has increased from 28,000 lbs. in 1869, 40,000 lbs. in 1880, 60,000 lbs. in 1886, 70,000 lbs. in 1895, and 80,000 lbs. in 1898 to 100,000 lbs. at the present date. Given in tabular form as regards these two classes of waggons on the Pennsylvania Railroad the figures work out thus:—

[TABLE

BOX CARS FOR FREIGHT SERVICE

Date of Adoption.	Dimensions of Body.										Highest Point from Empty Car.	Extreme Width.	Total Weight of Car Empty. lbs.	Remarks.
	Capacity.		Outside.		Inside.		Frame.		Height.					
	lbs.		Length.	Width.	Length.	Width.	Length.	Width.						
1879	16,000 to 24,000	28' 1 $\frac{3}{4}$ "	8' 7 $\frac{3}{4}$ "	27' 5 $\frac{1}{2}$ "	7' 11 $\frac{1}{2}$ "	6' 0 $\frac{3}{4}$ "	29' 10 $\frac{3}{4}$ "	8' 6"	11' 10 $\frac{3}{4}$ "	9' 4 $\frac{1}{2}$ "	20,800			
1881	40,000	34' 8 $\frac{1}{2}$ "	9' 0 $\frac{3}{4}$ "	33' 10 $\frac{1}{2}$ "	8' 4 $\frac{1}{2}$ "	7' 2 $\frac{3}{4}$ "	36' 4"	8' 11"	12' 9 $\frac{1}{2}$ "	9' 9 $\frac{1}{2}$ "	24,900			
1885	60,000	34' 8 $\frac{1}{2}$ "	9' 0 $\frac{3}{4}$ "	33' 10 $\frac{1}{2}$ "	8' 1 $\frac{1}{2}$ "	7' 1 $\frac{1}{2}$ "	36' 4"	8' 11"	12' 10 $\frac{1}{2}$ "	9' 10 $\frac{1}{2}$ "	30,200			
1886	60,000	34' 8 $\frac{1}{2}$ "	9' 2 $\frac{3}{4}$ "	32' 7"	7' 10 $\frac{1}{2}$ "	6' 10 $\frac{1}{2}$ "	36' 4"	8' 8"	13' 4 $\frac{1}{2}$ "	9' 11 $\frac{1}{2}$ "	36,300			
1891	60,000	36' 8 $\frac{1}{2}$ "	9' 0 $\frac{3}{4}$ "	35' 9 $\frac{1}{2}$ "	8' 2 $\frac{1}{2}$ "	7' 1 $\frac{1}{2}$ "	38' 4"	8' 11"	13' 0 $\frac{1}{2}$ "	9' 10 $\frac{1}{2}$ "	32,800			
1894	60,000	40' 1 $\frac{1}{2}$ "	9' 3 $\frac{1}{4}$ "	40' 0 $\frac{3}{4}$ "	8' 6"	8' 7"	41' 11 $\frac{1}{2}$ "	9' 2"	13' 6 $\frac{3}{4}$ "	9' 11 $\frac{3}{4}$ "	38,000		Furniture.	
1893	60,000	34' 8 $\frac{1}{2}$ "	9' 0 $\frac{3}{4}$ "	33' 9 $\frac{1}{2}$ "	8' 2 $\frac{1}{2}$ "	7' 2"	36' 4"	8' 11"	13' 0 $\frac{1}{2}$ "	9' 10 $\frac{1}{2}$ "	31,600			
1897	60,000	34' 8 $\frac{1}{2}$ "	9' 0 $\frac{3}{4}$ "	33' 9 $\frac{1}{2}$ "	8' 2 $\frac{1}{2}$ "	7' 0 $\frac{3}{4}$ "	36' 4"	8' 11"	13' 0 $\frac{1}{2}$ "	9' 10 $\frac{1}{2}$ "	35,400		Produce.	
1898	80,000	34' 8 $\frac{1}{2}$ "	9' 0 $\frac{3}{4}$ "	33' 9 $\frac{1}{2}$ "	8' 2 $\frac{1}{2}$ "	7' 2"	36' 4"	8' 11"	12' 10 $\frac{1}{2}$ "	9' 10 $\frac{1}{2}$ "	35,300			
1896	60,000	50' 10 $\frac{1}{2}$ "	9' 3 $\frac{1}{4}$ "	50' 0"	8' 6"	8' 7"	51' 10 $\frac{1}{2}$ "	9' 2"	13' 6 $\frac{3}{4}$ "	9' 11 $\frac{3}{4}$ "	42,000		Furniture.	
1901	80,000	34' 8 $\frac{1}{2}$ "	9' 0 $\frac{3}{4}$ "	32' 6 $\frac{1}{2}$ "	7' 10"	6' 11 $\frac{3}{4}$ "	36' 4"	8' 11"	13' 8"	9' 9 $\frac{1}{2}$ "	43,000		Produce.	
1901	100,000	37' 1 $\frac{1}{2}$ "	9' 4 $\frac{1}{4}$ "	36' 0"	8' 6"	8' 0"	38' 6"	8' 4"	13' 2 $\frac{3}{4}$ "	9' 10"	45,800			
1901	100,000	37' 1 $\frac{1}{2}$ "	9' 4 $\frac{1}{4}$ "	36' 0"	8' 6"	8' 0"	38' 6"	8' 2 $\frac{3}{4}$ "	13' 2 $\frac{3}{4}$ "	9' 10"	44,200			

GONDOLA CARS FOR FREIGHT SERVICE

Date of Adoption.	Capacity. lbs.	Dimensions of Body.						Highest Point from Rail with Empty Car.	Extreme Width.	Total Weight of Car Empty. lbs.	Remarks.
		Outside.		Inside.		Frame.					
		Length.	Width.	Length.	Width.	Length.	Width.				
1869	28,000	31' 1½"	8' 0"	30' 9¼"	7' 6½"	33' 1"	8' 0"	6' 2½"	8' 9"	18,500	Drop Bottom.
1874	50,000	24' 0"	8' 0"	23' 6½"	7' 6½"	26' 0"	8' 0"	8' 5½"	9' 0½"	20,700	Hopper Bottom.
1880	40,000	33' 7½"	8' 0"	33' 0"	7' 5"	35' 7"	8' 0"	6' 11½"	8' 8½"	24,800	Hopper Bottom.
1886	60,000	26' 0"	8' 11"	25' 6¼"	8' 5½"	28' 0"	8' 11"	8' 5"	9' 11½"	26,700	{ Hopper Bottom. { Without Coke Rack.
1888	60,000	33' 7"	8' 11"	33' 0"	8' 4"	35' 7"	8' 11"	7' 0½"	9' 11½"	26,800	Drop Bottom.
1888	60,000	33' 7"	8' 11"	33' 0"	8' 4"	35' 7"	8' 11"	11' 11½"	9' 11½"	29,900	{ With Coke Rack. { Drop Bottom.
1896	60,000	33' 7"	8' 11"	33' 0"	8' 4"	35' 7"	8' 11"	8' 2"	9' 11½"	30,300	{ High Sides. { Without Coke Rack.
1891	60,000	36' 4½"	9' 2"	35' 5"	8' 5"	38' 4"	8' 11"	6' 5"	10' 0"	26,800	Drop Bottom.
1895	70,000	28' 0"	8' 11"	27' 7"	8' 5"	30' 0"	8' 11"	9' 5"	9' 10½"	35,200	{ Self-Cleaning Hopper { Bottom.
1896	60,000	26' 0"	8' 11"	25' 6½"	8' 5½"	28' 0"	8' 11"	9' 1"	9' 11½"	26,800	Hopper Bottom.
1898	80,000	33' 7"	8' 11"	33' 0"	8' 4"	35' 7"	8' 11"	7' 0½"	9' 11½"	31,700	{ Low Sides. { Drop Bottom.
1898	80,000	33' 7"	8' 11"	33' 0"	8' 4"	35' 7"	8' 11"	8' 3½"	9' 11½"	34,400	High Sides.
1898	100,000	32' 1"	10' 1½"	31' 6½"	9' 6"	33' 0"	9' 6½"	10' 7½"	10' 1½"	39,200	Drop Bottom.
1898	100,000	29' 0"	10' 8½"	28' 6"	9' 5½"	30' 5"	9' 5½"	10' 0"	10' 1"	33,800	Steel Cars.
1898	80,000	27' 0"	9' 5½"	26' 6"	9' 0"	29' 0"	9' 5½"	9' 9½"	10' 1"	31,600	" "
1899	80,000	36' 4½"	8' 11"	35' 5"	8' 5"	38' 4"	8' 11"	6' 8"	9' 11½"	33,900	" "
1900	80,000	40' 6½"	10' 0"	40' 0¼"	9' 6½"	42' 2"	9' 0½"	11' 8½"	10' 2½"	33,900	Coke Car.
1901	100,000	38' 3"	9' 4"	37' 3½"	8' 9"	40' 0"	9' 4"	7' 1½"	9' 11½"	41,000	Steel Underframe.
1901	100,000	38' 3"	9' 4"	38' 2½"	9' 3½"	40' 0"	9' 4"	7' 8"	9' 11½"	38,400	Steel Car.
1902	100,000	38' 3"	9' 4"	38' 2½"	9' 3½"	40' 0"	9' 4"	7' 8"	9' 11½"	...	{ Steel Car. { Steel Car.
1902	100,000	38' 1"	9' 4"	37' 8"	9' 3½"	40' 0"	9' 4"	7' 8"	9' 11½"	...	{ Drop Bottom. { Steel Car.
1902	100,000	38' 1"	9' 4"	37' 8"	9' 3½"	40' 0"	9' 4"	7' 8"	9' 11½"	...	{ Drop Ends. { Steel Car, Drop Ends, { and Drop Bottom.

The proportions of the different sizes of waggons controlled by railway companies in July 1901 are shown by the following figures, which refer to $81\frac{1}{2}$ per cent of the total, as represented by box, coal, gondola, and flat waggons; the remaining $18\frac{1}{2}$ per cent consisting of cars below 20 tons in capacity, and of refrigerator and stock cars :—

lb. capacity.	No. of cars.	Percentage of total.
40,000	266,446	17.909
50,000	210,413	14.143
60,000	526,223	35.371
70,000	21,501	1.445
80,000	153,949	10.348
100,000	34,363	2.310
	1,212,895	81.526

Of box waggons with a capacity below 20 tons (that is, American tons of 2000 lbs. each) there were 27,752 in use in the United States early in 1901. Many lines are endeavouring to eliminate waggons of this class, the demand for them, when trade is brisk, being small, and the use of them in combination with the heavier cars being not free from danger. One line, in fact, went to the extreme of making a bonfire of its small cars, and getting rid of them in that way. All the same there is a disposition to think that a limit in car construction has now been reached, and the

American Railway Association has adopted the following as the "standard dimensions of box cars" in that country, recommending all railway companies and car builders to conform thereto as soon as practicable :—

That the dimensions of the standard box car be 36 feet in length, 8 feet 6 inches in width, and 8 feet in height, all inside dimensions. Cross section, 68 square feet; capacity, 2448 cubic feet. The side door opening to be 6 feet in width.

That the standard 36-foot car be considered the unit for the establishment of minimum car-load weights; and that where necessary in any classification territory to recognise cars under 36 feet in length, it shall be by a reduced minimum of $2\frac{1}{2}$ per cent for 35-foot cars, and 5 per cent for cars 34 feet or under, inside dimensions.

That the minimum car-load weights of heavy articles, such as iron, brick, lumber, minerals, etc., should as fast as practicable be advanced to the stencilled capacity of the car.

That no box cars of larger dimensions than those prescribed for the standard car shall be hereafter constructed, and that all owners and builders of cars be officially notified of the adoption of this resolution.

The pressed steel waggons now so much in use in America have a nominal capacity up to 100,000 lbs., with a maximum of 110,000 lbs., and it is claimed for the representative type of pressed steel hopper car that the proportion of paying freight to the total weight of car, when loaded, is 73·03 per cent. The total length of this waggon is 31 ft. 6 in., and the outside width

over all is 10 ft. Waggon of this description are used for coal, ore, or limestone, and they are so constructed that the "floor" begins to start off from each side 2 ft. from the top, at an angle of 30 degrees, until two doors are reached, the opening of which, by means of a lever, allows the entire contents of the waggon to fall at once through the trestles on which the waggon is run into the barge, vessel, or vehicle placed underneath to receive them. A pressed steel gondola waggon will have a total length of 37 ft. 6 in., a width of 10 ft. 2½ in., a capacity of 100,000 lbs., and a maximum of 110,000 lbs., the rate of paying load to total weight of waggon when loaded being 75½ per cent. The latest type of box waggon is, perhaps, no greater in actual dimensions than those previously used, but it is mounted on a pressed steel underframing, and not only has this waggon a capacity of 100,000 lbs., but it is claimed that that weight might be put in the centre of the waggon without causing any "sagging." As showing the demand for waggons of this type, I may mention that since 1897 the Pressed Steel Car Company, whose headquarters are at Pittsburg, has supplied 85,000 pressed steel waggons for use on various railways, and is now turning out an average of 100 a day, in addition to freight trucks, engine trucks, etc.

Concurrently with the era of larger waggons came the era of more powerful locomotives, and these have so far increased in size that they may now represent

a weight on the driving wheels of 166,000 lbs. or 176,000 lbs., while the latest type of locomotive of all, for use on heavy grades, has a total weight of 200,000 lbs. or more. The "Atlantic" type of engine used on the New York Central and Hudson River Railroad for express trains has a total weight of 176,000 lbs., exclusive of tender, and is supplied with a "traction increaser," a device by means of which an additional 10,000 lbs. is thrown temporarily on the driving wheels, so as to give them that much additional adhesive weight on the rails at starting. Another leading feature of the kind of locomotive being largely built in the United States at the present time is the fact that the wide fire-box permits of a larger grate area than previously, giving greater efficiency in the consumption of fuel and the evaporation of water, greater freedom from smoke, and greater ease in stoking engines of so large a size. This increased width of fire-box is more readily obtained in the case of an American than in that of an English locomotive, because in the United States the space between the two sets of lines, where a double track has been laid, is 7 ft., as compared with 6 ft. in England, the American engineers being thus able to get a width of 10 ft. 6 in. for locomotives, while the limit in Great Britain is 9 ft. In the same way there has been a distinct advantage for the American locomotive in regard to increased height. In Great Britain most of our railway tunnels and bridges were constructed at

a time when it was thought that the size of locomotives had been definitely fixed, so that the greatest height above the rail level to which a locomotive can be built on this side of the Atlantic is 13 ft. 9 in., the average being 13 ft. But in the United States, where the top of the engine may be $14\frac{1}{2}$, 15, 16, or even $16\frac{1}{2}$ ft. above the rail level, the need for tunnels is comparatively rare, while, as I have already shown, the practice has been to allow the street traffic to pass directly over the rails rather than to construct bridges carrying it above the railway, as in England. Where, too, in the United States, such tunnels or over-bridges have been constructed, they have been made higher than our own, partly because the American engineers, building later, could better anticipate the newer developments, and provide for them accordingly, and partly because of an arrangement in the working of American freight trains to which there is no parallel in England,—that, namely, under which men are stationed on the top of the waggons, either to apply the hand-brake in case of need, or to assist in the shunting operations. For the protection of these men there is placed at the side of the line, just before a tunnel or an over-bridge is reached, a post with a projecting arm from which a number of ropes are suspended so that they will strike against the brakeman as the train goes along, and give him timely warning. Originally, I am told, railway engineers designing over-bridges or tunnels allowed space for a brakeman to be at least seated on the top

of a goods waggon, so that when the time came for increasing the dimensions of locomotives and cars it was possible to do this without so much reconstruction of the lines as would otherwise have been necessary. All the same a good deal of bridge-raising or track-depression has had to be done as well. Then, too, as the locomotive engineers increased the size of the boilers, they reduced the height of the smoke stack, which now, in the case of American engines, is of much smaller dimensions than in the ordinary type of English engines.

The increase in the size alike of waggons and locomotives on the American lines, to suit the exigencies of the expansion of business, necessitated changes which in themselves—apart from any question of general betterment—were sufficient to necessitate an almost complete reconstruction of the lines. When a start was made with the big engines and the expanded freight cars, pressure had to be put on the engineering department to strengthen the bridges. Already on many of the railways wooden trestles had given way to iron bridges, and now steel began to be substituted for iron on the main lines, or permanent stone structures for steel, the iron or the steel bridges being taken to the branch lines, where they supplanted the wooden trestles still in use there. In some instances there were bridges which had been built five times over, in various forms of solidity, before the final stone structure, destined to serve for

all time, was reached ; and such instances are referred to by American railway men as typical of the principle on which most of the older lines have been constructed. Then it was found necessary to put down a heavier rail for the heavier trains to run on, the lighter rails having an unpleasant habit, under the greater weights, of curling up and penetrating the floors of the cars. So rails of 60 lbs., 70 lbs., 80 lbs., or even 100 lbs. had to be laid on main lines according to the amount of traffic.¹ Next the ballasting had to be improved, and longer side tracks, longer shunting yards, and new engine-houses had to be provided. No less necessary were larger turn-tables, and at New York I heard of one that was being built for the New York Central and Hudson River Company with a diameter of 70 feet, the motive power being a gasoline engine. Then the workshops were found to be too small, and had to be rebuilt, the existing cranes were too light, the goods depôts required to be enlarged, while on top of all this came the still further increase of traffic, due not only to natural growth but to the ability of the railway companies to handle business more cheaply.

¹ The following figures will illustrate the variations in the weight of the steel rails in use on different lines on June 30, 1902 :—Chicago and Alton : 80 lb. rails, 586 miles ; 75 lb., 59 ; 70 lb., 315 ; 60 lb., 50 ; 50 lb., 2. Illinois Central : 100 lb. rails, 4 miles ; 85 lb., 1184 ; 75 lb., 1570 ; 70 lb., 402 ; 67 lb., 121 ; 61½ lb., 33 ; 60 lb., 1165 ; remainder, 58½ lb. to 50 lb. ; average, 71 lb., against 64 lb. in 1901. New York, Ontario, and Western : 95 lb. rails, 37 miles ; 76 lb., 259 ; 67 lb., 62 ; 62 lb., 19 ; 58 lb. and 56 lb., 42 ; 50 lb., 28. Indianapolis and Louisville : 75 lb. rails, 239 miles ; 67 lb., 150 ; 60 lb., 53 ; 56 lb., 40 ; 52 lb., 36.

So the advent of the bigger locomotive and the enlarged waggon involved a great expenditure on the part of the American railways, as shown by the fact that the New York Central Company are rebuilding practically every bridge over 6000 miles of track, and the Atchison, Topeka, and Santa Fé has replaced 1900 wooden bridges by permanent ones during the course of six years. But here, again, there has been in all this a great advantage on the side of the American lines as compared with the probable cost of a like transformation in Great Britain. Built to answer the purposes of immediate necessities, and with the certain prospect of more or less reconstruction in the not far distant future, the American railways can be much more readily adapted to meet the new requirements than would be the case in Great Britain. Neither, too, under the existing trading conditions, was there anything like the same difficulty as there would be here in regard to the alteration of private wharves, yards, sidings, turn-tables, weigh bridges, coal tips, etc., or to inducing producers or traders to change their methods of procedure so as to adapt their operations to the sending of larger loads. It is true that in some cases a certain degree of moral suasion had to be exercised on the part of the railway companies. When, for instance, a scarcity of cars arose, it was always the man who had only a 30-ton lot for a 40-ton waggon, or who only partially filled a coal waggon instead of piling it up in the centre, that suffered first, while the man who filled a

waggon to the best advantage got the waggons that were available. The lessons thus taught, whenever necessary, were soon learned, and the matter adjusted itself. Then, again, in southern Illinois and along the valley of the Mississippi the market gardeners and others who were sending their consignments to market in small lots were induced by the railway agents to combine those consignments so as to secure the advantage of car-load rates, thus effecting a saving as compared with what they had been paying for lots under 100 lbs., and at the same time facilitating the operations of the railways. The plan adopted was for the growers or producers in a particular village or district to agree among themselves on a "general consignee" in Chicago, to whom they sent the whole of their consignments in car-load lots, he subsequently settling with each one separately according to the amount of goods received. If the growers became dissatisfied with their Chicago representative they simply selected some one else in his place. As against this there may be put the fact that the very earnest efforts made not long ago by a certain English railway company to induce farmers to combine, and send their produce to market in bulk, instead of in small lots, failed because one farmer would not run the risk of letting another farmer know to what destination he was sending his goods.

While I found American railroad officials unanimous in the conviction that the large type of waggon was admirably adapted for American railway business, and

while they were ready enough to declare that, but for this kind of waggon and the locomotives to match, they would not be able to manage their traffic at all, the majority of those with whom I conversed did not care to commit themselves to any recommendation of the use of such large waggons in Great Britain. Since one of the leading British railway officials has placed on record that "on the various British railways the average load of general goods to a truck capable of conveying a weight of from eight to ten tons varies from 25 cwt. to 40 cwt. only," the caution shown by the American experts in regard to the amount of probable freight per car in England was not surprising. The nearest approach I got to a definite recommendation was that the American type of enlarged freight waggon might be used for the transport of coal on certain British lines where that commodity is carried in exceptionally large quantities. While, too, it was taken for granted that the advantages were all on the side of the American railways in regard to the handling of a large volume of freight, there was one prominent official, at least, who was warm in his praises of the way in which light merchandise is dealt with in Great Britain. He said :—

Ours is wholesale business. Yours is retail. We get bigger lots than you do, and we can handle them to better advantage ; but in regard to general merchandise your arrangements are far better than ours, and, as a railway man, I tell you frankly that I do not think your companies charge enough for what they do. Here, in the

United States, it is a station to station business. The companies do not undertake either collection or delivery. When the freight comes to hand we send a postal card to the consignee to tell him it has arrived, and then we wait for him to send for it. Some of the large business houses fetch their consignments every day, but only about 33 per cent of the freight is cleared away at once, and it will be, on an average, about three days before we get the remainder off our hands. This means that a good deal of space is taken up, and we often have to provide two depôts, one for in-bound freight, and the other for out-bound freight, in the very heart of a city, where the land is dearest. At one of your big London termini the merchandise that arrives during the evening will be sent off by ten o'clock the next morning, and the floors will be clear for whatever comes to hand during the day. If the American companies only had control of the cartage arrangements in the same way as the English companies have it would be a great economy, and though they would naturally have to charge something extra for the additional service, they would be able to do it cheaper than the consignees can do it for themselves. But there is a fear that if delivery were undertaken by the railway companies it would lead to a cutting of rates, and so it is not done.

Of still more serious import, however, than this question of the congestion of goods in depôts is that abuse of the freight-car service which for fifteen or twenty years constituted one of the weakest points in American railway administration, and was checked only so recently as July 1902. Under the system that grew up in the working of the different lines the payment

to one company for the use of waggons belonging to another company was based on the actual number of miles run, and not on the period of detention, and it was to the interest of nobody but the owning company to see that the waggons were loaded or unloaded promptly, and sent back again as soon as possible. In this way the waggons were subjected to detentions which greatly reduced their earning power. One class of traders, taking advantage of their very convenient size, would systematically use them as substitutes for warehouses, leaving the freight in them on some siding or other until it suited their convenience to remove it; and where the competition was keen one railway company would, in its desire to get large consignments, even offer a trader to let him keep the commodity in the waggons (especially if they were "foreign" waggons) as long as he desired. In other cases an individual with no capital would purchase a large quantity of goods by raising money on bills of lading issued by a railway company, and then speculate thereon, the railway holding the freight in waggons for sixty days. Other persons, again, without either warehouses or credit, would secure advances from banks on bills of lading given to them by a railroad company in respect to waggon-loads of grain, which they would leave with the railway until they could find some one to buy it from them. The outcome of these and other conditions may be illustrated by the case of Chicago, where, during the course of a single month, on a single line of railway,

5630 waggons of freight were detained for over five days each, giving a daily average detention of 225 cars, which occupied more than a mile and a half of side track in the most crowded part of the city. In another instance, also in Chicago, a railway company had 115 waggon-loads of freight awaiting the convenience of customers, and of these 115 seven had been on hand over thirty days, and the remainder, with a single exception, for over a week.

The effect of these conditions, coupled with the use that one company would make of another company's waggons, paying only for actual mileage run, was a very serious reduction in the freight waggon mileage, which diminished, in fact, in the case of waggons away from home, from an average some years ago of about 40 miles a day (in some cases the waggons ran an average of between 60 and 90 miles a day) to one of from 18 to 24 miles a day. When once a car left the lines of its owners there was no knowing when it would return. It might spend months, and even a year or two, in wandering about between Canada and Mexico, or act as an impromptu warehouse for long periods, especially in New England, which became known among railway people as "the graveyard of cars." In the former case the owning company would have to trust the other companies concerned for due payment for the mileage done, having no means of checking their figures, and in the latter case it would get no compensation at all for the detention. Abuses of this kind led to the organisation by the railways,

some ten or fifteen years ago, of Car Service Associations, which laid down the rule that traders who took more than forty-eight hours to load or unload a waggon should pay \$1 each day for demurrage. This had some effect for a time, but when the traders found that the companies themselves were not scrupulous about detaining or using one another's cars they declined to pay the dollar per day, and the evil remained as acute as ever. Not only had it much to do with the periodical car famines, but it meant that the railways, which had invested no less a sum than \$750,000,000 in freight waggons, were actually operating them at a loss, through being deprived, more or less, of the use of something like 150,000 waggons at a time. That so shrewd a set of men as the leaders of the American railway world, with their keenness for keeping down the item of cost in every shape and form, should have tolerated such a state of things for so long a time is almost incredible. True it is that many attempts were made to eradicate the evil, but there was a lack of unity among the companies, the difficulties were great, and for many years it seemed hopeless to expect that any reform would be brought about. Eventually the American Railway Association formed a Bureau of Car Performances and Statistics, with Mr. J. W. Midgley as manager, and a series of powerful letters on the subject, issued from Chicago by Mr. Midgley, led to the compilation and enforcement, from July 1, 1902, of a "Code of Per Diem Rules," the first and most important of which lays down that "the

rate for the use of freight car shall be 20 cents per car per day, which shall be paid for every calendar day, and shall be known as the *per diem* rate." When the railway companies thus found themselves saddled with a payment of 20 cents a day for every "foreign" waggon on their lines they had a direct interest in sending such waggons home as soon as possible, and not only did they hold the traders firmly down to the \$1 per day penalty imposed by the Car Service Associations, but they got rid at once of any unemployed waggons standing on their own lines. Thus there set in such a movement of waggons as had not been known in the history of the United States railways before, and many of the companies received back as many as added at least 10 per cent to their available waggon equipment.

V

THE PASSENGER BUSINESS

It has a somewhat startling effect on the mind of the visitor from Europe when he hears from one American railway official after another that, speaking generally, their passenger business does not pay, and that it is an expense to the companies rather than a source of income. It is admitted that there are exceptions to the rule, but on most of the lines the passenger traffic yields not much more than 10 per cent of the receipts, and in some instances it will represent no actual profit at all. In almost every instance it is to the freight business that the American railway companies look for their chief revenue, and if they still do all they possibly can to stimulate the passenger traffic, it is because they hope by so doing to get more and still more freight. Railway officials in America have an axiom that a man "ships" his merchandise by the route he travels, so that, if they can only secure his patronage as a traveller, which in itself may not be much, they will count on carrying his merchandise or agricultural products,

which may amount to a great deal. Hence it is that the railway companies (nearly all of whom have some more or less serious rival or rivals to keep a close eye on) are untiring in their energy and enterprise in working up the passenger traffic as a means to the still more important end of securing an increase in freight. Competing companies vie with one another as to which can offer to the travelling public the greatest comforts, conveniences, and attractions for their money, until the leading trains on which all these things are found in their highest development become little more than travelling advertisements, which are talked about, make the line better known, but are not run at any direct profit. In the western States, where the passenger traffic is considerably less than it is in the east, but where the competition between the different railways is even keener, the same rivalry is shown, and the general standard of comfort and attractiveness in the principal trains is, if possible, still higher. Whether a line carries 10 passengers or 100, the equipment must be maintained at the same high level, unless a line would see its rival get the business it wants to do itself.

This method of advertising by means of luxurious travel could not be carried very much further than is the case in regard to the New York Central and Hudson River Company's "Twentieth Century Special," which makes the journey from New York to Chicago, or *vice versa*, in twenty hours. Here one finds—in addition to the ordinary arrangements of Pullman

sleeping-cars—a bathroom, a barber's shop, an observation car, and a library, while woodwork and decorations are of the most costly style. Besides the open sleeping-cars there are drawing-rooms and compartment cars, where those who wish for a greater degree of privacy can have it on paying more money. The smoking-room is a good-sized apartment, provided with comfortable arm-chairs, and having the look of a club-room rather than that of a railway car. Then there is a shorthand writer and typist who accompanies the train a good part of the distance, and any one can make free use of his services in dictating correspondence, the idea being that a traveller to Chicago or New York shall be able to carry on his business on the train just as if he were in his own office. To this end, also, the closing prices of the New York and Philadelphia exchanges will be received *en route* and posted up. As for the lady passengers, who may not want either a typewriter or the closing prices, they are furnished with a lady's-maid, while their particular needs are further studied by the provision for them of electrical contrivances on which they can heat their curling-tongs. The fares by these trains are substantially higher than by the ordinary express trains, but only a limited number of passengers can be carried (even if there were any great number of people willing to pay the price of such luxuries), and nobody pretends for one moment that there is much profit in the business. But it makes a good advertisement.

Up to the early part of 1903 the Pennsylvania Railroad Company ran a similar train between Jersey City and Chicago, calling it the "Pennsylvania Special"; but on the lines of that company the complications of freight traffic were greater than on those of the New York Central, so that the train could not keep time, and involved much trouble in the working of the system generally. It was therefore discontinued.

The peculiar conditions of American travel, and especially the keen competition between the various railway companies, have further given rise to the organisation of a passenger ticket agency system which has no parallel among ourselves. It is true that English railway companies have "city offices" in London and other large cities or towns, where passengers can buy their tickets, but this arrangement is a very much simpler matter than the exigencies of American railways are thought to require. In England a person wanting to go a long journey, say from London to Inverness, is considered well able to choose his own route, and the purchase of his ticket, whether at railway station or at city office, would be a purely formal procedure. But in the United States the planning of a long-distance journey, such as from New York to San Francisco, is a much more complicated affair, owing to the variety of routes and the desirability of arranging in advance for sleeping-cars, etc. Points arise, therefore, which cannot be discussed with the booking clerk at the railway station, and the pro-

spective traveller wants to talk over the matter across a counter with some one who is an expert in the matter of routes. To this end, and especially to avoid letting a competing line obtain any advantage, every important railway company will have its city offices—either entirely to itself or in combination with other companies—not only in New York, but in all the leading cities of the United States. The agents in charge of these ticket offices give the fullest possible information to any one wanting advice, and, though it is a matter of course that they do all they reasonably can to get business for their own lines, they are assumed to be strictly impartial as regards all the other railways when they issue a through ticket. In New York there must be (at a guess) at least 100 of such ticket offices along Broadway, and there would probably be still more but for the fact that by agreement among the companies each is limited to seven ticket agencies on Manhattan Island and to three in Brooklyn. The ticket agents have a national organisation, which meets every year in a different part of the United States, the object being both to obtain an interchange of ideas and to give the agents a better opportunity of becoming practically acquainted with routes and cities, and thus make them more qualified to assist those who seek advice.

In addition to the recognised ticket offices of the railway companies themselves there is in almost every large city in the United States a class of men, known

as cut-rate agents, who get possession of tickets or portions of through or circular tickets issued by the railway companies, and so manipulate them that they are able to sell them at a lower rate than would have to be paid by the purchaser if he obtained them direct from the companies. This manipulation, if not the actual forging, of railway tickets has attained to almost the dimensions of a fine art in the United States, and the cut-rate agents carry on their business quite openly, in regular shops, in front of which one sees placards notifying that Denver or some other such place is "cheap to-day."

The lengths to which people will go in the United States in depriving the railway companies of their due are further shown in the case of season tickets, or commutation tickets, as they are called. There is a certain line which at one time issued such tickets available (as in the case of an English season ticket) for any number of journeys during a certain period, but they were discontinued because it was found that entire families would travel, one by one, with the single ticket. Then the company issued a card which allowed of a stated number of journeys being made, and the figures from, say, one to sixty were printed round the ticket in such a way that the conductor on the train could punch a small round hole in the divisions in which the figures were, one hole being punched for each journey. But the discovery was made that, after this had been done, a passenger would pick up the round bit

of card which the collector had punched out of the ticket, would carefully preserve it, and afterwards put it back into the hole, hammering it in so well that the hole would be filled up again, and the ticket appear the same as before. A high official on the line in question was informed of what was being done, but regarded the thing as incredulous, until a conductor produced a commutation card which to all appearance was perfectly sound, but was shown by him to have had quite a number of holes filled up in the way described. Thereupon the conductors were supplied with nippers that cut out the entire section of card on which the number of the journey was printed, and though this morsel might fall to the ground, the two edges of the square could not be re-attached to the card with the ease and success with which a round hole could be filled up again with the piece that had been taken from it.

The ticket agents in charge of the city offices of the railway companies are supplemented by travelling passenger agents, whose business it is to secure traffic for their line whenever and wherever they possibly can. There is in the United States a constant flow of population, and especially of the agricultural population, from the east to the west, and also from the north to the south, and it is the province of the travelling passenger agent to go, if need be, 500 or 600 miles in order to secure for his line the patronage of a party, say, of migrating farmers. Or he may hear that

a pleasure trip or a convention is being arranged, and in the same way he will be off at once to consult the organisers. If he can book the party, so much the better. If not, he will call on the local agents and see that the interests of the line are being kept well to the front, so that his journey will not be fruitless.

There are similar agents, both city and travelling, in regard to freight. As illustrating the way in which business is pushed by these men, the story is told of a travelling freight agent to whom a manufacturer said he would not send anything by the agent's line unless he got reduced terms. The agent was supposed not to grant any reduction, but he got over the difficulty by saying, "I will bet you (so much) that you won't send anything over our line." The manufacturer accepted the bet, and the agent lost, as a matter of course. These travelling agents, especially, represent a class of men of great tact, judgment, and persuasive power, and, as the outcome of essentially American conditions, they constitute a body almost unique in its way.

At the head of all the different agents in the passenger department of each and every line of railway is the general passenger agent, who directs the whole machinery, and is exceptionally keen on advertising his line in every possible way. The most characteristic form that American railway advertising takes is the "folder"—a pamphlet, sheet, or map which "folds" into a size convenient for being carried in the pocket, and generally contains the time tables of the company concerned, a

map of the lines, and, it may be, a good supply of information about the sights, attractions, or advantages of the district served. Matters of general interest will also be dealt with. For instance, during the Chinese war an excellent map of China, with a description of the country, was issued, folded up in compact form, the moral of the story told being, of course, that the proper way to get to China was by way of the lines—so far as they went—of the particular railway company that was distributing the map. Such “folders” will be issued by individual railway companies to the extent of 500,000 or 600,000 or more in the course of a year, and in every ticket office and leading hotel special boxes will be found filled with the folders, which are so arranged therein that the essential part of an attractive outer sheet will catch the eye at once. But much more than this is done, for there are companies which print and distribute what are often most admirable guide books concerning their routes—books that are both well written and well illustrated. Some of the companies also bring out excellent magazines, full of readable articles and attractive pictures. As regards the wide circulation of all this mass of printed matter, the general passenger agent of the New York Central and Hudson River Company (who has, perhaps, carried the art of advertising as far as any railway man in the United States, and has a variety of novelties to his credit) sends regularly the literature published by his line to every United States consular agent throughout

the world, in the interests of travelling Americans. There is no limit, in fact, to the enterprise that the American railways will go to in the way of self-advertisement, and the amount expended thereon must be enormous; but the general passenger agent of the Denver and Rio Grande Railroad, who brings out fourteen distinct publications every year, and in eighteen years has had the spending of no less than \$1,500,000 in advertising the attractions of his company's route through the Rocky Mountains, by means of folders, pamphlets, coloured photographs, etc., assured me, when I spoke to him on the subject, that "the money all comes back."

An organisation distinct from that of passenger agent and freight agent, and having functions essentially its own, is that of the industrial commissioner. This further development of American railway business originated with Mr. Luis Jackson, who created the *rôle* (if a theatrical expression may be allowed) in connection with the Chicago, Milwaukee, and St. Paul Railway. The idea of Mr. Jackson (who is an Englishman by birth and served his apprenticeship to railways in England) was not only to secure greater traffic for his line by making known to the fullest possible extent the natural resources of the States through which it passed, but to promote the actual setting up of industrial enterprises in those States by bringing together the people who could start them but had no money, and the people who had the money but not the business experience. In this way he sought to attract new

capital to the district, and, under the scheme he set up, no enterprise, however unpretending, was too small for him to assist; for, even if the concern itself did not bring much freight direct to the line, it meant that more people would settle in a particular place, and every additional family meant the transport of more food, clothing, and other domestic necessities. Another part of the system is to make a thorough study of one particular form of industry after another, such as timber, farming, the management of dairies, the utilisation of water power for paper mills, etc., and publish separate pamphlets, leaflets, or maps giving precisely the information as to locality, prospects, and so on, that any one desirous of starting in any particular business would want to know. Alternatively inducements would be offered to manufacturers in other parts of the United States to start local branches, so as to be in close touch with the consumer, and save in cost of freight. Still another part of the system is that of advertising extensively in trade papers information as to matters dealing exclusively with the industry represented by the journal in question. But the information so given is never absolutely complete, the aim being to leave some points open, so that people interested will want to communicate personally with the industrial agent, who is not only willing to put his advice and assistance at the disposal of those who want them, but is especially keen on getting in touch with individual inquirers. In certain cases the railway would give a

siding to a company starting a new business adjacent to its lines. The outcome of this system has been that many new interests have been introduced into the extensive district in the north-west served by the Chicago, Milwaukee, and St. Paul Railway, with a corresponding increase alike in freight and in passenger traffic, while the railway itself is now no longer so dependent on grain crops as was formerly the case. So successful has the scheme been, in fact, that an industrial commissioner is now a recognised official on the staffs of most of the American lines of railway.

Organisation of this kind is still more important when a company not only wishes to increase its traffic in unsettled or thinly-populated districts, but also has land to dispose of, and has thus an additional incentive to see more population and more industries. The Great Northern Railroad Company is reported to keep thirty-four men at work in the country east of Chicago advertising the north-west. "These men," it is said in the *Investors' Supplement*, in which I read the statement, "avoid cities, and give talks, illustrated by lantern slides, in school-houses and town-halls in the rural districts; they exhibit Washington products as object lessons, and distribute quantities of printed matter concerning that State. In the south the company's men follow the circus and work upon the circus crowd in like manner." Dealing further with what it calls the "Pioneer Service of Railroads," the *Investors' Supplement* goes on to say :—

There are other pioneering methods which might be called of the "home missionary" class. Thus, the Illinois Central, in conjunction with the National Good Roads Association, has run a "good road train" across country to New Orleans; the Southern Road has done the same in the territory traversed by its lines. Such a train consists mainly of platform cars, which carry road-making machines and road-makers; it travels slowly, and wherever it halts it talks of the value of good roads, explains how they are made, and adds the most convincing object-lesson by making a piece of road, which it cheerfully as well as necessarily leaves behind it. The first visible effect of this effort is in founding State Good Roads Associations and awakening interest in the subject, which leads to legislation and also always (often at once) to substituting the contract system of road-making for the ancient rural custom of personally "working out" the road tax upon the roads.

As indicating the extensive way in which this work is done, and the time and money spent in the effort, it may be pointed out that at the time of the National Good Roads Association Convention held at Mobile, November 27 to November 30, 1901, the Southern Railway Company provided a train of twelve cars, elaborately equipped with stone crushers, heavy steam rollers, and all modern road-making machinery. This train toured the system under the auspices of the Good Roads Association. The train left Alexandria, La., October 29, 1901, and completed its journey December 21 at Greenville, S.C. Quite lengthy stops were made at all important points, and exhibitions given of road-building. Various other conventions have been held, one at Charleston, in connection with the Charleston Exposition, another at Raleigh, February 10 to 15, 1902, still another at Charlottesville, April 2, 3, and 4,

1902, etc. All this is part of a plan devised by the Southern Railway Company for the improvement of the waggon roads of the south in pursuance of the company's policy to encourage the growth and development of all territory tributary to the system.

Whoever notes the systematic and well-planned advertising which a dozen or more railroads are doing directly, and examines the leaflets and booklets, most of them highly creditable in every respect, which may be had at any large ticket office, will be able to gather a notion of pioneer railroad work. Arrangements for extensive colonisation work in the south-west, it is now announced, have recently been completed by twelve roads. Southern Missouri, Louisiana, Texas, Arkansas, Indian Territory, and Oklahoma are mentioned as the sections included in the plans, which are to be along the familiar lines, including low-rate "homeseeker" excursions. In some instances this pioneer work had been varied by coming into some sections of the south and showing what new crops might be profitably cultivated there and how to go about it.

It would be foolish to pretend that this is in any respect or degree philanthropic work, but equally foolish to deny that it is useful. It is done by intelligent self-interest, pluckily and cheerfully pushing out according to American methods. But the railroads are as far from being really devouring monopolists as from being loving philanthropists. They cannot thrive—they cannot even live—unless the country thrives; and they are wise enough to know this and to do their part towards making it thrive. This cannot be too often or too forcibly said, because it is so easy to denounce railroads right and left. Moreover, it is blind and unfair, either in the day of general prosperity or when the times are less kind, to forget the risks the

railroads took in pushing out into new territory and their great share in developing it.

In this connection I should like to quote, also, the following extract from an article contributed to the *Milwaukee Sentinel* by Mr. C. W. Mott, general emigration agent of the Northern Pacific Railroad:—

For those roads at least which run through the more sparsely settled States, the department on which the most reliance must be placed for permanent increase of earnings is the department charged with the work of populating the country and fostering the industries, not which are located, but which can be located, along its line. One road may place the work in charge of one department, while another may put it somewhere else, but no company can ignore this branch of the service with any reasonable prospect of maintaining its place in the race. Do you ask, "What enters into the work of peopling a country?" Many things, far more than the average person dreams of. Some think that low rates will do it. It will unquestionably help; in fact, it is doubtful if ever a strong tide of emigration was directed into any channel without this aid, but it will not do the work alone. The passenger representative can work with the man who wants to move, but the successful emigration agent must know the country he wants to settle, not only know what it is, but what it can be made to be, and what class of people are most likely to be successful in developing it. Then he must cast his eye over the older settled portions of the country and see where he is likely to find people who would succeed in the new country, and once having determined on his hunting ground he must begin to set his traps.

It must be evident from all this that in regard to new and undeveloped country such as one finds in so great an abundance in the United States there may be an actual need for the beating up, as it were, of traffic, and especially for the execution of pioneering work in general, to which there can be no possible parallel in the United Kingdom; so that here again we get striking evidence alike of the great difference there is between the conditions existing in the one country and those to be found in the other, and the futility of attempting to regard the essential operations of both from the same standpoint. At first sight it may appear from the facts I have given that the American railways are far more enterprising, especially in regard to the passenger business, than our own; but the statistics given in Chapter II. as to the relative proportions of passenger and freight traffic in the two countries show how much greater need there is for activity in this respect in the United States than is the case in Great Britain, where the problem too often is not so much how passengers can be got, but how they can be carried in such prodigious quantities, especially in the case of local traffic in the great cities. In fact, an American railway president, in discussing this very question with me, declared, "England has the best passenger business in the world, and in that respect, at least, there is much for us to learn from you in the way you handle it."

VI

ON THE CARS

IT takes the Englishman in the United States some time before he can make up his mind whether or not he likes the conditions of travel he finds there, and on some points he may still be uncertain even when he returns home. Nominally there is only one class on the American railways—the so-called “first-class.” In my humble opinion “omnibus class” would be a more correct designation. In Great Britain railway men speak of “coaches”; in America they speak of “cars,” and the difference between the two words is well in keeping with the difference between the vehicles themselves. A “coach” will hold only a limited number of persons—a sort of select party,—and is capable of variations in the matter of accommodation according to the tastes and the purses of the patrons. “Car,” on the other hand—and especially as embodied in the word “tram-car,”—suggests a vehicle open to all comers, without any differences either in arrangements or price. The one studies individual tastes, and recognises class

distinctions. The other is an essentially democratic institution, puts all people on the same level, and assumes that their wishes, if not also their purses, are identical. To use a word much in vogue to-day, the American railway car "standardises" its patrons. So long as a traveller wants nothing more than any one else he answers the pattern fixed by the railway companies; but immediately he begins to develop individual tastes and likings he becomes a railway misfit.

The ordinary American "first-class" railway car of to-day accommodates from sixty to eighty persons. Some illustrations I have seen show that in the very early days the English type of passenger car was used; but it was found that on railways constructed in the primitive fashion spoken of in the first chapter a long, heavy car ran with greater smoothness on rails laid on more or less imperfect road-beds than small and comparatively light ones would do. Experience further showed that the heavier car had greater stability—and therefore gave greater security to the passengers—in the too frequent collisions due to the original "wild cat" system of running the trains, the derailments resulting from defective track, or other such accidents. For long journeys, too, there was a decided preference on the part of the American people, with their essentially sociable disposition, for a car in which they could move about freely instead of a compartment of strictly limited proportions. In the same way there was a greater need for lavatory arrangements in trains going long

distances than on trains making only short journeys. These various reasons sufficed to establish the long corridor car as a standard, and such changes in construction as have since taken place have been in the direction of a still further increase in the general dimensions, and, consequently, in the number of passengers carried per car. The developments in the last forty years are indicated by the table given on the following page in reference to the passenger cars used on the Pennsylvania Railroad.

If the car is not crowded, and if one is going only a short journey, the travelling will be found pleasant enough. On each side of the central gangway (the car being entered from either end) there are seats for two persons, these seats all facing in the same direction, though there is an arrangement by which the back of the seat can be reversed, so that a party of four can sit together. As a rule, a passenger travelling by himself will take one of these double seats and be left in solitary enjoyment of it until all the other seats have been so far occupied that it becomes necessary for some one else to take the one alongside of him. He thus has one neighbour, and one only. I mention this the more particularly because I have heard the point raised as to a "lack of privacy" in American railway travelling. In so far as one travels in a car holding so many persons there is, of course, a decided lack of privacy. But it is only fair to say that, in effect, there is more of what I may call individual privacy in the ordinary American

railway car (with which alone I am now dealing) than

Date of Adoption.	Capacity Persons.	Dimensions of Body.				Face to Face of Drawhead.	Height from Rail to Top of Roof, Empty.
		Length and Width.	Inside.	Outside.	Frame.		
1862	52	Length 45' 10 $\frac{1}{2}$ "		46' 7 $\frac{1}{2}$ "	46' 6"	53' 0"	13' 3 $\frac{3}{4}$ "
1867	54	Width 8' 6"		9' 4 $\frac{1}{2}$ "	9' 2 $\frac{3}{4}$ "		
		Length 45' 9 $\frac{1}{2}$ "		46' 7 $\frac{1}{2}$ "	46' 6"	53' 0"	14' 1 $\frac{1}{2}$ "
		Width 8' 6 $\frac{1}{2}$ "		9' 4"	9' 2 $\frac{3}{4}$ "		
1876	66	Length 45' 10 $\frac{1}{2}$ "		46' 7 $\frac{1}{2}$ "	46' 6"	53' 0"	14' 1 $\frac{1}{2}$ "
		Width 8' 6 $\frac{1}{2}$ "		9' 4 $\frac{1}{2}$ "	9' 2 $\frac{3}{4}$ "		
1878	52	Length 45' 8 $\frac{1}{2}$ "		46' 7 $\frac{1}{2}$ "	46' 6"	53' 0"	14' 1 $\frac{1}{2}$ "
		Width 8' 5"		9' 4"	9' 2 $\frac{3}{4}$ "		
1882	52	Length 45' 8 $\frac{1}{2}$ "		46' 7 $\frac{1}{2}$ "	49' 6"	53' 0"	14' 1 $\frac{1}{2}$ "
		Width 8' 11"		9' 10"	9' 8 $\frac{3}{4}$ "		
1885	58	Length 45' 8 $\frac{1}{2}$ "		46' 7 $\frac{1}{2}$ "	46' 6"	53' 0"	14' 1 $\frac{1}{2}$ "
		Width 8' 9"		9' 10"	9' 8 $\frac{3}{4}$ "		
1891	64	Length 52' 10 $\frac{1}{2}$ "		53' 9 $\frac{1}{2}$ "	53' 8"	60' 9 $\frac{1}{2}$ "	14' 1 $\frac{1}{2}$ "
		Width 8' 9"		9' 10"	9' 8 $\frac{1}{2}$ "		
1892	64	Length 52' 10 $\frac{1}{2}$ "		53' 9 $\frac{1}{2}$ "	53' 8"	60' 11"	14' 1 $\frac{1}{2}$ "
		Width 8' 9"		9' 10"	9' 8 $\frac{3}{4}$ "		
1895	60	Length 46' 6 $\frac{1}{2}$ "		47' 6 $\frac{1}{2}$ "	47' 5"	54' 8 $\frac{1}{2}$ "	14' 1 $\frac{1}{2}$ "
		Width 8' 6 $\frac{1}{2}$ "		9' 6 $\frac{1}{2}$ "	9' 5"		
1896	68	Length 52' 9 $\frac{1}{2}$ "		53' 9 $\frac{1}{2}$ "	53' 8"	60' 11 $\frac{1}{2}$ "	13' 11 $\frac{1}{2}$ "
		Width 8' 10 $\frac{1}{2}$ "		9' 10"	9' 8 $\frac{3}{4}$ "		
1898	68	Length 52' 9 $\frac{1}{2}$ "		53' 9 $\frac{1}{2}$ "	53' 8"	62' 2 $\frac{1}{2}$ "	14' 11 $\frac{1}{2}$ "
		Width 8' 10 $\frac{1}{2}$ "		9' 10"	9' 8 $\frac{3}{4}$ "		
1902	80	Length 69' 1 $\frac{1}{2}$ "		70' 1 $\frac{1}{2}$ "	70' 0"	78' 11 $\frac{1}{2}$ "	14' 1 $\frac{1}{2}$ "
		Width 8' 10 $\frac{1}{2}$ "		9' 10"	9' 8 $\frac{3}{4}$ "		

there is in an ordinary English railway compartment.

It is true that in the former one is seen by more persons on entering, but the moment the traveller takes his seat there is only one person to observe him or converse with him, and that is the individual on the seat alongside. He sees only just the tops of the heads of the occupants of the seats in front of him, and those behind see only the top of his head. In an English railway compartment, on the other hand, each of the six, eight, or ten occupants, who sit facing one another, can watch the movements of the others (and, generally speaking, they do so to relieve the tedium of the journey), listen to any conversation that is started, or, if bold enough, start a conversation himself with his fellow-travellers. There is, of course, the possibility on our side of a family party or a group of friends getting a compartment to themselves, and American travellers in Great Britain appreciate such a possibility quite as much as English people do; but, taking the ordinary conditions of travel, I do not think that too much should be made of this alleged lack of privacy in American railway cars, so far as regards the fact of a person being able to "keep to himself."

But a different set of conditions arises when one makes a journey in an ordinary "first-class" car with a full quantum of passengers. Here a man may "keep to himself," and, on the principle of *magna civitas, magna solitudo*, no one but the conductor who wants his ticket, the boy who wants to sell him a book, or the person sitting alongside, will take any notice of him.

But he cannot ignore the fact that there are sixty or so other persons in the same limited area, including, it may be, negroes, Chinese, working-men in clothes redolent of machine oil, and so on; that the already over-heated atmosphere (should it be winter, and the heating apparatus in its customary state of undue activity) has become almost unendurable; that children are running about, and that there are, possibly, babies "on board" whose crying is apt to become most wearisome. I really fail to see how all this can be regarded as "first-class," from the point of view of a European traveller at least.

If, again, the term "first-class" be a misnomer as applied to the ordinary day cars, none the less is it a mistake to say that in America there is "only one class." There are, for instance, the ordinary Pullman cars, which constitute the real equivalent in the United States to "first-class" travel in Europe, and must, indeed, be resorted to by any traveller who wishes for the comfort and conditions that a first-class fare should afford. The origin of the Pullman car was, of course, the need of making better arrangements for sleeping on night journeys than existed in the early sixties, when the first Pullman "Pioneer" car was run; and in this connection it must be remembered that the requirements of American travellers are altogether different from those of travellers in England. On our side of the Atlantic a sleeping-car may well be a sleeping-car and nothing else. A person making the night journey, say,

from London to Glasgow, joins the train in the evening, is ready to "turn in," if not at once, then, at least, after a smoke and a chat in the smoke-room, and he is at his journey's end by breakfast time in the morning. But in America the vehicle which takes the traveller from Chicago to San Francisco must be a sleeping-car at night and an ordinary car by day, with possibilities of speedy transformation affording the least possible inconvenience to the passengers. It is just such a vehicle as this that the Pullman sleeper represents. On our side of the Atlantic, for the reasons I have given, it is not wanted; on the other side it is indispensable.

The Pullman sleeping-car meets with a good deal of criticism, especially from English travellers. In the interests of those who are not acquainted with its design I may say that the ordinary double seats (by day) are fixed, facing one another, on each side of the central corridor, so that, if the car should have its full complement of passengers, they sit in groups of four, though it rarely happens that every seat is thus occupied. Each such set of seats represents a "section," and over each section the roof is so arranged that a strongly-made flap can be let down until it rests in a horizontal position, so as to form an upper berth. Upright boards are fixed between two adjoining sets of upper berths to separate the one from the other. The lower berth is formed by pulling out the two sets of double seats until they meet. Behind the roof-flap there is space enough for the mattresses, blankets, etc., to be stored

during the day, and these are taken out by the coloured attendant when he lets down the flap, the beds in lower and upper berths being then made up, according to the number of passengers in the car. In front of each section there are finally hung two heavy curtains, stretching from roof to floor. They are attached to the sides of the section and meet in the centre thereof, being there provided with loops and buttons so that after a person has passed behind them he can fasten the two together and not be observed by his fellow-travellers. It is either behind this curtain or while lying down, or sitting up, in the berth itself (there is just about room to sit up, and no more) that the operations of undressing and dressing are to be performed. Should both lower and upper berths be occupied, each will have a short supplementary curtain to conceal its occupant from the observation of the individual to whom the other has been assigned.

At first the English traveller finds it exceedingly awkward to disrobe behind the long curtains, what with the extremely limited space, the jolting of the train, and the passing of other passengers, or of the car attendants and train officials, to and fro along the narrow corridor, the limits of which are still further circumscribed by the space occupied by the individuals undressing or dressing, who bulge out the curtains behind which they stand ; but to undress in a seated or lying-down position in one's berth requires a degree of dexterity worthy almost of an acrobat. When at

last the feat has been accomplished, the berth will be found comfortable enough, though there is still the possibility of the car being either too hot or too cold. In my own experiences of Pullman car travel I have had the two extremes. I have been in cars where the steam heat was so excessive that the air behind my curtains was almost stifling, and I have spent the night bathed in perspiration, while on other occasions I have shivered with cold, and have added an overcoat to my supply of blankets. But, truth to tell, I oftener found the temperature of the car just about what it should be, the extremes I mention being the exception rather than the rule.

The arrangements detailed above are awkward enough for the male passenger, but they are still more inconvenient in the case of ladies, and especially of ladies travelling alone, for there is no special accommodation for ladies in the standard sleeper (as the ordinary sleeping-car is called), and they must take whatever berth they can get. Everybody engaging a berth beforehand naturally wants a lower one, the climbing into an upper berth being a procedure to be specially avoided ; but it may so happen that a lady will find that all the lower berths have been already taken, and that the only one available for her is the upper berth in a section where a gentleman has the lower berth. It is one of the courtesies of travel in America (though one that is not always observed, especially by foreigners) that in such a case as this the gentleman should give up his

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lower berth to the lady and take the upper one, not himself retiring until the lady has sought her couch and drawn the special curtain attached thereto. Whether or not such courtesy is shown, the situation may be embarrassing enough for lady travellers, and I leave the reader to imagine what the result would be in Great Britain if any railway company proposed to introduce this particular phase of American methods here, however reconciled to it the people in the United States may have become.

Ladies who object to the open sleeper, millionaires, families desirous of keeping together, and, I may add, honeymoon couples who wish to avoid publicity, have the alternative of engaging a "state-room," or a "drawing-room," designed to meet the wants of those railway misfits who decline to be standardised. The state-room has one full section (upper and lower berths), with separate toilet arrangements, and the drawing-room has one full section, a single lower berth, and toilet annexe. These rooms give the same privacy as a sleeping-compartment on a London and North-Western train would do, but by the usual manipulation they can be converted into private drawing-room cars during the day.

The Pullman car which thus represents the real "first-class" in the United States, and must be taken by any one who wants to make a long journey with any degree of comfort, is, however, a luxury that has to be paid for, and paid for at a pretty high figure if one desires

separate accommodation. For the journey from Chicago to San Francisco, for example, the ordinary "first-class" fare is \$62.50. The extra charge for a berth in the open sleeper is \$14, making a total of \$76.50. The cost of a drawing-room, with the three berths, is \$53, in addition to the ordinary fare for each occupant.

As a rule, the best trains in the United States, those of the "limited" type, are made up entirely of Pullman cars, for which the extra charges must be paid, so that while in Great Britain the third-class passenger can join most of the express trains, in America the holder even of a "first-class" ticket is excluded from the leading trains unless he pays the additional rates. On the other hand, it cannot be denied that those who do this, and patronise the "limited" trains, get good value for their money. Of the luxuriousness of these trains I gave some idea in the last chapter in referring to the "Twentieth Century Limited," run between New York and Chicago by the New York Central and Hudson River Company. There are many others besides which offer almost a maximum of possible comfort and convenience, among them being the "Overland Limited" of the Southern Pacific, the "Golden State Limited" of the Rock Island and the Southern Pacific combined, the "Pioneer Limited" of the Chicago, Milwaukee, and St. Paul, the "Lake Shore Limited" of the Lake Shore and Michigan Southern, the "Alton Limited" of the Chicago and Alton Railway, and the "Bay State Limited" and "Knickerbocker Limited" of the New

York, New Haven, and Hartford lines. Of these and other trains of the same type by which I travelled I can only speak in terms of the highest praise. But though no one can fail to appreciate the luxuries that such trains so fully afford on long-distance journeys in the United States, it cannot be at all suggested that the same kind of train is necessary in Great Britain. A man going from Chicago to Los Angeles by the Golden State Limited, and being "on board" sixty-eight hours, might, for example, appreciate the opportunity of being shaved (for a shilling), having his hair cut (for two shillings), and being supplied with a hot bath (for three shillings), all while the train was running at full speed. But there is no possible journey in our own country in regard to which such provision is necessary in the interest of passengers. The including in a train of "limited" proportions of barber's shop, bath-room, smoking-room, observation car (really a drawing-room with plate-glass windows at the end as well as at the sides), buffet, library, writing-desks, and so on, means, also, the taking up of a considerable amount of space that would otherwise be available for passengers. This "dead weight" must be paid for either by such direct charges as those for shaving, etc., or by the additional rates levied in respect to what are called "Pullman accommodations."

The traveller on a long-distance journey who pays only the ordinary fare, and who cannot, therefore go on a "limited" train, has his choice between a car of the

ordinary day type and a car fitted with what are called reclining chairs. On these chairs (which are arranged two and two on each side of the central corridor, as with the fixed seats) one can either sit up, or "recline" by adjusting the back, putting one's feet on a ledge projecting from under the seat of the chair in front; but the arrangement is said to be one that gives little opportunity for change of position when one is sleeping, and the all-night traveller—and especially the traveller who spends several nights and days in the train—must feel decidedly cramped by the time he reaches his destination.

There is now a middle course open to those long-distance travellers who cannot, on the one hand, afford to take a berth in a standard Pullman sleeper, and, on the other, want a greater degree of comfort than is to be got from the reclining chair. This middle course is represented by the "tourist sleeping-car." It was originally designed, I am told, by an official on the Southern Pacific Railroad. He had gone home on sick leave, and, while getting back his health, planned out the car in question in the special interests of the United States troops, who had previously had nothing but day cars in which to make night journeys across country. The new invention proved so great a success that it was soon adopted for ordinary travellers, and it is now quite an institution in the United States. In its present form the tourist car is almost identical in its general arrangements with a standard Pullman sleeping-car, the

main difference being that the tourist car is upholstered in rattan instead of plush, while there is little attempt at decoration, the elaborate carvings, plate-glass mirrors, and tasteful designs in various coloured woods found in the standard sleeper being one and all absent. The charges for accommodation on these tourist cars come under the head of "second-class rates," and would work out thus in the case of a "tourist" making the aforesaid journey from Chicago to San Francisco: Cost of second-class ticket, \$52.50; supplementary for berth in tourist sleeper, \$6; total, \$58.50; as against \$76.50 to be paid by the occupant of a berth in the standard Pullman sleeper.

These tourist sleeping-cars are largely patronised by the vast numbers of people who flock to California for pleasure or health, and they are also extensively used by families migrating from one part of the United States to another. In addition to sleeping and toilet arrangements, each car has, at one end, a heating range where coffee or tea can be made, potatoes roasted, and so on; and in inspecting some of the cars, in the course of my journey west, I noticed many a pleasant little family group gathered round an impromptu table in the centre of a four-seat section, taking, with every possible appearance of happiness and contentment, an evening meal of their own preparing. But assuming that these people, or any of them, were making such a journey as the 2577-mile trip from Chicago to San Francisco, lasting, say, three nights and three days, it was evident

that the arrangements for their comfort, even as second-class travellers, must be quite different from anything that would be necessary in the case of such comparatively short-distance journeys as alone can be taken in Great Britain.

The catering arrangements on American lines differ somewhat from those in vogue on British railways. The dining-car, whether it goes through or is only attached to the train at certain points, is used exclusively for feeding purposes, a passenger returning to his seat in the ordinary cars as soon as he has had his meal. In some cases a fixed charge of \$1 is made alike for breakfast, lunch, or dinner, but, generally speaking, the service is *à la carte*, the charges under the latter system coming to just about the same figure if one wants a good meal. In my own opinion the catering on the dining-cars of leading English railways is distinctly preferable, besides being cheaper, and also making provision alike for first- and third-class passengers. The *à la carte* arrangement on the American railways means that a great variety of food is taken on the train, in case it may be called for from the generally lengthy bill of fare, and that the cooks are actively employed in preparing separate meals all the time the car is open to passengers, with the result that more space is taken up, and more labour is involved, than is the case on English railways, where the *chef* provides a *table d'hôte* meal, for a fixed and reasonable price, so that when it is ready the cooks have only to serve out the portions. I was

not surprised to hear that on most lines of American railway the dining-cars are run either at a loss or with a very small margin of profit.

It is due to this cause, no doubt, that the Pullman Company have not themselves developed the running of dining-cars on their own account to any great extent, and have preferred to leave that branch of the business to the individual companies. But in regard to sleepers and parlour cars they have attained to a supremacy in America which only one or two railway companies, particularly enterprising or particularly independent, have cared to dispute. The arrangements between the Pullman Company who own the cars and the companies over whose lines they run vary according to circumstances ; but, speaking generally, a railway company pays the Pullman Company two or sometimes three cents a mile for the distance each car runs, the Pullman Company also taking the additional charges made in respect of the special accommodation, while the railway company keeps the ordinary fare. The Pullman Company also provide attendants. From all I could gather, the use of the cars is not very profitable to the railway companies, especially as they often run with but few passengers, and at first it seems strange that the American railway companies should be thus dependent on an outside organisation for their best type of cars. It is argued, however, that though competition renders the use of such cars compulsory, the demand for them varies so much on the different lines, according

to seasons, the holding of special conventions, and so on, that except in those cases where there is a fairly constant stream of traffic, it is better for the railroads to take on from the Pullman Company just such parlour or sleeping-cars as they want, without keeping a good deal of rolling stock of their own lying idle for considerable periods; while the Pullman Company can despatch cars to any or all of the different lines, north, south, east, or west, just as the exigencies of the traffic require. The position must, in fact, be looked at from an American rather than an English standpoint. The available stock of Pullman parlour and sleeping-cars is now 3500, and of these about 3000 will be running each day somewhere between San Francisco and New York, or Quebec and the city of Mexico. The average cost of each car is \$17,500.

By way of concluding this chapter I may give the following comparative statement, showing fares charged on American lines and on the London and North-Western Railway for the same number of miles. A true comparison is not easy to make, because the conditions are not the same; but if I am right in saying that the "ordinary," or so-called "first-class," on the American lines is in reality an omnibus class, then the comparison should be between the "ordinary" fares of the American lines and the third-class of the London and North-Western. Certain it is that the accommodation on the alleged "first-class" cars on the American railways is not a whit better than the third-class in a

London and North-Western third-class main-line train, and especially that of the third-class corridor coaches. Comparing, then, the "ordinary" American fare with the English third-class rates, the advantage will be found to be in favour of the latter; but, comparing the ordinary American, *plus* the sleeper, with the English first-class, *plus* the charge of five shillings for sleeper, any distance (sleepers being available on the London and North-Western for first-class passengers only), the advantage is in favour of the former. As against this one must remember that there is really no comparison between the two types of sleepers themselves. In America, in return for the extra fares quoted the passenger gets a berth in an "open" car, where a dozen or twenty or more of other passengers, men, women, and children, may also be sleeping. On the London and North-Western the passenger paying the extra five shillings over and above first-class fare will either have a compartment entirely to himself or be put in one in which there are two berths, the second of the two being allotted to another passenger only in the event of the train being full. As already shown, the charge in America for similar accommodation to this, in the shape of state-room or private drawing-room, would be considerably in excess of the charge for a berth in an ordinary standard sleeper.

[TABLE

Between.	Railway.	Miles.	American Fares.				English Fares.		
			Ordinary.	Parlour Car.	Sleeper.		1st Class.	2nd Class.	3rd Class.
			£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.	£ s. d.
Washington—Baltimore	Baltimore and Potomac	43	0 4 10	0 1 0	..		0 7 0	0 4 4	0 3 10 ¹
Euston—Betchley	Reading	46 ¹	0 4 0	..	..		..	..	..
Philadelphia—Atlantic City	Pennsylvania	56	0 4 0	..	..		0 8 6	0 5 1	0 4 7
Euston—Castlethorpe	Chicago, Milwaukee, and St. Paul	54 ¹	0 4 0	..	..		0 9 3	0 5 6	0 5 0
Philadelphia—Atlantic City	Pennsylvania	59	0 4 0	..	..		0 12 1	0 7 7	0 6 10 ¹
Euston—Roade	Pennsylvania	59 ¹	0 10 4	0 1 6	..		0 15 3	0 10 2	0 8 1 ¹
Chicago—Milwaukee	Pennsylvania	85	0 10 0	0 2 0	..		0 14 3	0 8 11	0 8 0
Euston—Rugby	Pennsylvania	82 ¹	0 11 4	0 2 0	..		0 15 3	0 9 5	0 8 6
New York—Philadelphia	Pennsylvania	90	0 12 8	0 6 0	..		1 16 2	1 0 10	0 18 10
Euston—Leamington	Pennsylvania	92	1 6 0	..	0 8 0		2 0 6	1 6 8	1 4 2 ¹
Philadelphia—Baltimore	Pennsylvania	95	1 10 0	0 4 0	0 8 0		..	..	..
Philadelphia—Nuneaton	Pennsylvania	97	1 12 0	0 4 0	0 8 0		..	..	..
Philadelphia—Atherstone	Pennsylvania	105	1 16 0	..	..		..	..	..
Euston—Atherstone	Pennsylvania	105	1 6 0	..	..		..	..	..
New York—Washington	Pennsylvania	228	1 10 0	0 4 0	0 8 0		..	..	..
Euston—Llandudno	Pennsylvania	227	..	..	..		..	..	..
Chicago—St. Louis	Pennsylvania	299	..	..	..		..	..	..
Euston—Carlisle	Pennsylvania	299	..	..	..		..	..	..
Chicago—Cincinnati	Pennsylvania	306	1 12 0	0 4 0	0 8 0		..	..	..
Euston—Gretton	Pennsylvania	307	1 16 0	0 8 0	0 8 0		..	..	..
Philadelphia—Pittsburg	Pennsylvania	354	..	..	..		..	..	..
Euston—Crawford	Pennsylvania	354	..	..	..		..	..	..
Chicago—St. Paul, Minneapolis.	Pennsylvania	410	2 6 0	0 4 0	0 8 0		..	..	..
Euston—Hamilton <i>via</i> Glasgow	Pennsylvania	420	..	..	..		..	..	..
Philadelphia—Buffalo	Pennsylvania	418	2 0 0	0 8 0	0 8 0		..	..	..
Euston—Paisley <i>via</i> Glasgow	Pennsylvania	419	1 17 0	0 8 0	0 8 0		..	..	..
New York—Buffalo	Pennsylvania	462	1 12 0	0 8 0	0 8 0		..	..	..
Euston—Coupar-Angus <i>via</i> Perth	Pennsylvania	465	1 12 0	0 8 0	0 8 0		..	..	..
New York—Buffalo	Pennsylvania	444	2 10 0	0 4 0	0 10 0		..	..	..
Euston—Perth	Pennsylvania	450	2 8 0	0 8 0	0 10 0		..	..	..
Chicago—Kansas City	Pennsylvania	458	..	..	..		..	..	..
Euston—Stanley <i>via</i> Perth	Pennsylvania	457	..	..	..		..	..	..
Pittsburg—Chicago	Pennsylvania	468	..	..	..		..	..	..
Euston—Ardler <i>via</i> Perth	Pennsylvania	468	..	..	..		..	..	..

VII

THE PITTSBURG BLOCK

It is in the Pittsburgh district that the congestion of freight traffic experienced of late in various parts of the United States has assumed its most acute form. Pittsburgh itself is a city of extremely circumscribed dimensions, being situated on a point of land, some 400 acres in extent, lying between the Allegheny and the Monongahela rivers, which here unite and form the Ohio. Immediately in the background is a range of hills further limiting the possible dimensions of the city proper. Within a radius of sixty miles, however, there is a collection of small towns which are all contributory to Pittsburgh as a business centre. What has mostly led to Pittsburgh's success is the fact that the best bituminous coalfields in the country are to be found there. Good limestone, too, and ample supplies of natural gas are procurable within a convenient distance. With the further facilities for obtaining iron *via* the Lake Erie ports, and coke produced from coalbeds at Connellsville specially suitable for cooking

purposes, there was every reason why Pittsburg should become the centre of the most important of America's steel, iron, and coal industries, and the development of the whole Pittsburg district has been remarkable. Great industries, and especially great iron and steel industries, have been established to such an extent on the limited space available for them in the valleys of the rivers mentioned, that new-comers have to go further and still further afield, while populous towns are springing up in places which not long ago were merely green fields or waste tracts. This has been the case, for instance, with the town of Vandergrift, lying some forty miles to the east of Pittsburg. In 1895, or thereabouts, Vandergrift did not exist. But some extensive steel works were set up where it now stands, and within two years there was a town of 5000 inhabitants. To-day the population is probably 7000. Five years ago the district served by the South Fork Railway, to the east of Pittsburg, did not produce any coal at all. It is now consigning to Pittsburg every day some 300 waggons of coal, each representing about 30 tons. Of other parts of the district similar stories could be told.

No less striking have been the developments at Pittsburg in regard to the output of steel during the last few years. One of the chief reasons is the enormous extent to which steel is now being used in the United States for the framework of blocks of offices or business premises of the "sky-scraper" type. What can be done

in the way of using structural steel for buildings may be illustrated by the Frick building at Pittsburg, a block 217 ft. long by 100 ft. wide, and standing twenty-one storeys high above the street level, with three below. It contains a total of 560 rooms available for offices, besides a gentlemen's outfitting shop on the tenth storey, a barber's shop and a handsome restaurant in the basement, with a suite of rooms on the top floor intended for use as a club. The service of elevators includes both stopping cars and an "express" car to the tenth and higher storeys. Internally, there is a great profusion of marble for walls, floors, and pillars, the total amount of marble used representing 220,000 ft.; but the important fact from our present point of view is that the framework of the monstrous structure consists entirely of steel girders, the total amount of steel used for this purpose being 7000 tons. With such speed can buildings of this type be raised, owing to the use of structural steel, that the one in question was ready for tenants within one year of the excavations being begun. A peculiarity of these steel-frame structures is that the work of filling in the walls of the different storeys—resting, as such walls do, on the steel girders—can be carried on at any point or on any floor quite independently of the other floors below or above. In its size and general arrangements the Frick building may be exceptional; but "sky-scrapers" similarly constructed around a skeleton of steel, and having their sixteen, eighteen, twenty, or more storeys, are to be found to-day

in all the leading cities of the United States, and in many small towns as well, while even in the case of ordinary private houses steel girders are being extensively used in the place of wooden joists. The increase in the manufacture of steel in the United States during the last few years must, in fact, be due in a substantial degree to the leading position which that article is now taking among builders' materials.

Another factor in the demand for iron products in America is to be found in the present needs of the railway companies themselves for more locomotives, more waggons, more rails, and more bridges. During their period of depression in the years before 1897 the companies were less lavish in their expenditure on equipment and improvements than they are now that prosperity has come upon them with a rush and the demands for transport are greater than can be met. Then, in countless ways, the boom given to American industries in general has reacted on the particular interests of which Pittsburg forms the centre, the final outcome of the various home conditions which have thus prevailed, combined with the increase in exports, being that the total output of steel in the United States advanced from 5,000,000 tons in 1896 to over 13,000,000 in 1901.

But the railway companies operating in and around Pittsburg have to provide for the transport of a good deal more than merely the contribution made by the district in question to this great production of American steel. Before they take out the finished article they

must bring in the raw materials. The supply of the needs of new or greatly increased populations (largely composed of labourers brought together from all parts of the civilised globe) makes further demands on railway facilities, and there is the additional important consideration that all the through business of both the Pennsylvania and the Baltimore and Ohio railway systems from east to west, and *vice versa*, must pass by way of Pittsburgh, thus converting the city into a great centre for through traffic, quite apart from the local business that is pouring in upon the various railway companies from all the district round about in one mighty and ever-increasing stream.

It is, however, only within the last year or so that any really serious difficulty has been experienced at Pittsburgh in coping with the expansion of freight traffic. When, in 1897, the country emerged from its previous state of commercial depression the railway companies found themselves with a large reserve of accumulated elasticity, while their business between 1898 and 1901 showed an advance equal to about 60 per cent on that for 1897. But, following on the wave of prosperity which, in combination with the advance in agriculture, was adding so greatly to the volume of freight, there came, in November 1901, a long period of cold weather which reduced to such an extent the hauling capacity of the available motive power that a serious congestion of traffic began to arise, not only at Pittsburgh, but in other centres of the United States as well. The rail-

roads which centre on Pittsburg increased by about 22 per cent the tonnage carried by them in 1902 as compared with 1901; but fresh freight came to hand at a greater rate than that at which the companies could provide the necessary increase in facilities, and from October 1, 1902, the demands of the public for transport facilities were greatly in excess of the capacity of the companies to respond to them. This condition of things was greatly aggravated by the necessity for the Pennsylvania and Baltimore and Ohio Companies to devote a large part of their energies to transporting bituminous coal to the seaboard and New England, to take the place of the anthracite coal, the supply of which had been cut off by the strike in the anthracite district.

Altogether the position was such that the traffic carried during 1902 over the roads composing the Pennsylvania system east and west of Pittsburg aggregated nearly 270 million tons, being an increase of 26 million tons, or more than 10 per cent, over the previous year.

The first of the three difficulties mainly responsible for the congestion which arose was the inadequate supply of locomotives. It is the exception for railway companies in America to build their own locomotives, and, although the shops of the locomotive construction companies had been quite equal to supplying the demand for engines either to take the place of those worn out or to meet a normal increase in the demand, they were

not equal to a sudden accession of orders that was altogether abnormal. Such, indeed, was the condition of affairs at the end of 1902 that certain railways which had just made contracts for fresh locomotives took it for granted they would not get them for a period of at least twelve months. The time when locomotive companies in America kept engines on stock, and were reputed to be able to "send round" in the afternoon—more or less—any that were ordered in the morning, has now long since gone by.

The second great difficulty was the lack of adequate accommodation in the yards where the freight trains are classified and made up afresh, according to the destination of the different waggons composing them. This point cannot, perhaps, be better illustrated than by taking the case of the Pennsylvania Railroad Company in regard to its freight traffic between Pittsburg and Atlantic ports.

As already indicated, Pittsburg is not only a place of origin for a vast amount of traffic, but is a centre for traffic passing to or from points further west. Another such collecting and distributing centre is Altoona, and still another, before Philadelphia is reached, is Harrisburg, waggons being sorted, and goods trains made up, according to requirements, at each of these points. The system of shunting adopted, as I saw it at Altoona, was most interesting to watch. In the receiving yard on one side of the signal-box in which I stood there was a long goods train from the east, and on the other side,

in the classification yard, were a score or so of sets of rails branching out in consecutive order and in parallel lines from the particular set on which the goods train in question stood. On each side of this train was an engine with a "pole" car—that is to say, a car from which a long wooden pole was suspended horizontally, in such a way that, when it was swung out, it would—on the engine being set in motion—push along the line any car or cars against the end of which it was placed. The *modus operandi* was that the engine on one side should, by means of the pole referred to, push off an uncoupled waggon (or set of waggons), proceeding with it sufficiently far, and at a sufficiently high speed, to give it a momentum that would carry it past the signal-box to the classification yard, the engine then coming back to repeat the operation. While the one engine was returning the second would "pole" another waggon in the same way, so that the two engines were constantly travelling to and fro, pushing the waggons forward in rapid succession, until the whole of them had been sent off. On each waggon so propelled sat a man with his hand on the brake, prepared to stop the waggon at the right moment. But he had nothing to do with its precise destination in the classification section. This was settled by the operator in the box. Having been previously furnished by the yard-man with a detailed statement showing how the train was made up, it was he who arranged on which of the score of tracks in the classification yard each particular waggon should run,

according to his list. This he did by merely pressing a button on the board of an electro-pneumatic apparatus which operated the entire set of points. In doing this there was no need for him even to move from the chair on which he sat. Waggon succeeded waggon in rapid succession as the engines poled them along, the system being one that allowed of seventy-five "cuts" of single, or sets of, waggons being made in an hour. Arrived on the proper track in the classification yard, the waggon joined on to the others by means of the automatic coupler, and when a train of waggons had been thus made up nothing was left to be done but for a locomotive to be attached and start it on its journey, either direct to some particular city or to the next set of yards further east or west, as the case might be. To show the amount of work which a single set of yards may be required to do, I may say that, on the occasion of my visit to Altoona, there were 1289 waggons in the classified section, and 1504 in the non-classified section. In the division of the Pennsylvania Company system lying between Altoona, on the east, and Pittsburg, on the west, a distance of 116 miles, and including those two places, there had been awaiting movement at six o'clock that morning 2781 waggons going east and 2578 going west, these figures representing fairly normal conditions; while of freight trains then in actual movement in the same division there were about fifty going east and thirty-five or forty going west.

The alternative to the pole system of shunting was

what is known as the "hump" or gravity system. Under this method the engine slowly pushes the entire train of waggons along a line of rails which, at a certain point, rises at a gradient of 2 feet in 30 until a height of 8 feet or 10 feet is reached, this elevation forming the so-called "hump." On the other side there is a descent equal to $2\frac{1}{2}$ per cent for a distance of 300 feet, and then one of 1 per cent until the level is reached. As each waggon in turn arrives at the top of the hump it is disconnected, and the law of gravitation gives it momentum enough to enable it to reach its particular set of lines in the classification yard, as arranged by the signal-box operator, the brakeman on the waggon checking the speed as may be necessary. The hump is regarded as a more up-to-date method of shunting than the pole, and it is especially preferred because it allows of the use of only one engine instead of two. It is said to work very well, provided only that sufficient space is allowed between the loosened waggons to permit of one switch being closed before another is opened ; but as "H. F." has pointed out in a letter to *The Times* of January 19, 1903, both the "pole" and the "hump" systems are only a development of what has been done in Great Britain for many years.¹

¹ "H. F." went on to say in his letter:—

"It is half a century ago that the North-Eastern Railway constructed a most complete arrangement of gravitation sidings for coaling ships at Jarrow on the Tyne, by which waggons ran to and from the coal jetties by the side of the vessels in as rapid succession as they could be tipped into the hold. The London and North-

With time- and labour-saving methods such as these the American railways ought to be able to perform their shunting operations with promptness and despatch ; but there were said to be more cars on the lines than the

Western Railway in 1880 revolutionised their goods traffic by opening their great marshalling yard at Edge-hill, on the outskirts of Liverpool, which enabled them to start their goods trains with the punctuality of passenger trains, an achievement which was never accomplished before then. As many as from 2500 to 3000 trucks are collected at Edge-hill, brought from the various depôts on the long line of Liverpool docks in the course of every twenty-four hours ; these trucks, loaded with all kinds of traffic or returning mineral empties, run down hill by the force of gravity through a special arrangement of sidings by which they are first sorted into groups, and subsequently the trucks in each group are marshalled, as a train, in the order required to facilitate their distribution on the subsequent journey with the least amount of work and delay, the whole process being accomplished without the assistance of a locomotive, all necessary changes in the relative position of the trucks being effected by one passage through the system of sidings. This could not have been accomplished had not the London and North-Western Railway, with a foresight as creditable as it was fortunate, secured some sixteen years before a large area of land, before the growing city reached it. The late general manager of the Great Western Railway, Mr. Grierson, read an account of this marshalling system at Brussels at the meeting of the International Railway Congress in August 1885, which was commented upon in your leading article on the work of that congress. Thirteen or fourteen years afterwards the Government of Saxony adopted the Edge-hill system on a still larger scale at Dresden, and exhibited very complete plans of the scheme at the World's Fair at Chicago. The Lancashire and Yorkshire Company constructed a marshalling ground on the 'hump' system not many years after the Edge-hill sidings were opened. It is not, therefore, surprising that such enterprising men as the American engineers have developed these methods on the colossal scale suited to the magnitude of their traffic as described by your correspondent. One of their yards is $2\frac{1}{2}$ miles in length. At what busy railway centre in this country could such a space now be found without being intersected by roads ?"

yards would hold, and more goods trains made up than the companies could get engines to draw. Such had been the state of congestion not long previously that a number of furnaces had had to close down because the railway companies could not bring to them sufficient coke; but they were not worse off than some of the railways themselves in various parts of the country, for these lines, owing to the block, could not get coal even for their own locomotives. Prodigious efforts were made to remove the block in the Pittsburg district, and one Saturday and Sunday in November 20,000 waggons, having an average load of twenty-five tons each, were got out of the congested area, while another 5000 went through the process of classification. Such herculean efforts as these, however, meant that other parts of the system were depleted both of engines and of workers, and, inasmuch as the attempt to grapple effectually with the plethora of freight traffic had been going on continuously, on some of the lines, day and night, week-day and Sunday, for at least twelve months, officials and *employés* were beginning to find the strain almost greater than they could bear.

In the third place, the blocks that have occurred have been seriously aggravated by the inadequacy of the lines of railroad for dealing with the amount of traffic offering.

Of the various measures which are being taken by the Pennsylvania Railroad Company in order alike to prevent any further congestion of their own lines east

of Pittsburgh and to provide for future requirements, the most important is the construction of alternate tracks which will make a wide circle around both Altoona and Harrisburg, so that solid through freight trains can pass those places without having to go into the yards there at all, and without interfering with, or being interfered with by, the traffic on the main lines. There is also to be a new west-bound gravity yard constructed at Altoona at a cost of \$750,000. Other new yards, or enlargements of existing ones, are under way at Harrisburg and elsewhere. At Pittsburgh there are to be additional tracks laid down to improve the connections with other railways, to complete the final links in a belt line around the city, or to provide increased facilities generally, especially in regard to the bituminous coal and coke traffic. At various points between Pittsburgh and Philadelphia new lines will be made in addition to those mentioned above, existing lines will be double-tracked or four-tracked, gradients will be reduced, and other additions or improvements carried out, representing a total estimated expenditure on lines east of Pittsburgh of \$67,000,000. In addition to this there are to be extensive improvements on the leased lines west of Pittsburgh. In regard to locomotives, the Pennsylvania Company (which builds a certain proportion of its own) is constructing new shops at Altoona, so as to be able to turn out another 100 engines in the year.

The Baltimore and Ohio Company are also increasing

their yard accommodation at Pittsburg and elsewhere, ordering new locomotives, and adopting other measures for improving their traffic; and the various other lines concerned are adopting a similar policy.

The provision of all these increased facilities is, however, necessarily a question of time, and for the present the railway companies have to struggle with the situation as best they can. That they will eventually overtake it is a matter of course; but they have a good deal more to provide for than may appear on the surface, as is shown by the significant fact that towards the end of 1902 one large steel-making concern in the district gave timely warning that, with a view to increasing its productive powers, it intended to carry out extensions and improvements at its works which would involve an outlay of from \$8,000,000 to \$10,000,000, and necessitate a still further substantial increase in the demands it was making on the carrying powers of the railways.

VIII

TRACK ELEVATION AT CHICAGO

THE city of Chicago offers, perhaps, the most striking example of the heavy expenditure which is falling upon the American railways in the need to bring them up to the standard of present-day requirements, more especially in the interests of the general public. The particular question that arose at Chicago was the elimination within the city itself of those level-crossings which were the original characteristic of nearly the whole of the lines throughout the land, and are still one of their most noticeable features to-day.

The position of Chicago in this respect has been the more serious both because of the extent of the city and of the conditions which have led to Chicago becoming the greatest railway centre in the United States. Organised as a city so recently as 1837, with a population then of only a little over 4000, and with an area of only 10 square miles, Chicago has now 1,698,000 inhabitants, covers an area of 186 square miles, and has at least one street which extends a distance of

24 miles from the northern to the southern boundary. Into this city there enter railways from every part of the United States to the extent of a score or more, and representing a total mileage of 90,000 miles; but even to-day there are many points in and around Chicago where all the ordinary traffic of street or highway passes directly over as perfect a network of railway lines as may be seen, for instance, outside Crewe Station or Rugby Junction. These crossings, mainly unprotected, are survivals of the conditions that led to a system of compulsory betterment being inaugurated in Chicago against the railway companies in May 1892; but so great was the amount of work to be executed that, though there has been no relaxation in the policy in question, a good many more years, probably, will pass before all that is necessary will have been done.

Before 1892 it was the recognised practice that all the various railroads entering Chicago should do so by passing through or across the streets or highways, and the loss of life was deplorable, the total number of persons killed by railway accidents, from various causes, in the city of Chicago alone being at that time between 300 and 400 per annum. It was the well-grounded expectation that a vast number of people would visit Chicago for the World's Fair held there in 1893 that led the city rulers to resolve on their policy of requiring the railway companies to elevate their tracks above, or to depress them below, the street level, a Department of Track Elevation being appointed by them to ensure the

carrying out of the ordinances which, to this end, they imposed from time to time. Although, however, the dangers were admittedly great, the local authorities showed due forbearance towards the railways. They began operations against the wealthiest of them, and they dealt only with a certain amount of line at a time. Inasmuch as the width of ground occupied by such companies ranged from 66 feet to 200 feet, and as the city boundaries extended to so great a distance, any arbitrary action in requiring the work to be done all at once, in each instance, would have put the railways in a most serious position.

The first of the companies against which an ordinance was made was the Illinois Central, which was singled out for the initial operation, not only because it was a wealthy company, but also because of the magnitude of its suburban business at Chicago. The company was, in the first place, required to elevate its roadbed and tracks from Forty-seventh-street to near Seventy-first-street. Its right of way between these two points is 200 feet in width, and, with main lines and suburban lines combined, it forms an eight-track road. This meant the elevation, to begin with, of over twenty-eight miles of rails altogether, and the construction of thirteen subways in place of level crossings. Many other ordinances followed alike against the Illinois Central and against other railway companies, the elevation of track being generally done by the construction of solid embankments by means of retaining walls filled in with cinders, slag, clay, gravel,

sand, or other materials, with a provision of steel bridges wherever necessary. The railway companies themselves readily recognised that, with the rapid growth alike of the population of Chicago and of their own business, they could not possibly continue to operate their systems in a way which involved very grave risk to the public, on the one hand, and a substantial interference with the working of their own traffic, on the other. If they ran their trains at a good speed through populous districts there was the danger of their killing people; and if they went at reduced speed they had complaints from their passengers. It was only by means of track elevation they could hope to satisfy everybody. So there was a loyal co-operation between the companies and the city authorities, and the final outcome of the movement is shown by the fact that ordinances had been passed by the city council, and accepted by the railway companies, from May 23, 1892, to December 31, 1902, for the elevation of roadbed and tracks, covering the following amount of work:—

Total number of miles of main tracks to be elevated	121·80
Total number of miles of other tracks to be elevated	689·65
Total number of subways to be constructed	513
Total estimated cost of entire work	\$33,463,250

Elevation done from May 23, 1892, to December 31, 1902:—

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Total number of miles of main tracks	
elevated	67·81
Total number of miles of other tracks	
elevated	337·71
Total number of subways constructed	251
Total estimated cost of work done	\$22,080,000

Leaving work to be done under all ordinances that had been passed from May 23, 1892, to December 31, 1902, as follows :—

Total number of miles of main tracks to be	
elevated	53·99
Total number of miles of other tracks to be	
elevated	351·94
Total number of subways to be constructed	254
Total estimated cost of work to be completed	\$11,383,250

It should be explained that in Chicago a number of companies, ranging from two to five, will own a joint road, and use a "Union" station, as it is called, so that in these cases the cost of part of the track elevation is divided among the companies concerned. The fresh ordinances made during 1902 comprised over twenty-eight miles of main tracks and 165 miles of other tracks to be elevated, with the construction of ninety subways in different parts of the city.

To the figures given above may be added a table which shows the total deaths by railway accidents in the city of Chicago, with the percentage of deaths by railway accidents to all deaths by violence, from 1891 to 1901 :—

Years.	Total Deaths from all Causes.	Total Deaths from Violence.	Percentage of Deaths from Violence to Deaths from all Causes.	Total Deaths by Railroad Accidents.	Percentage of Deaths by Railroad Accidents to all Deaths by Accidents.
1891	27,754	1457	5	301	21
1892	26,219	1573	6	355	23
1893	27,083	1879	7	387	21
1894	23,892	1537	6	256	17
1895	24,219	1458	6	222	15
1896	23,257	1363	6	198	14
1897	21,809	1415	6	186	13
1898	22,793	1536	7	221	14
1899	25,503	1554	6	228	15
1900	24,941	1577	6	258	16
1901	24,406	1674	6	241	14

It will be seen that the number of fatal railway accidents occurring in Chicago is still unduly high, whatever may be the precise cause to which they are attributable, and the city may be exceptional in this respect, as it certainly is in regard to the large number of railways that have their terminals there. But the case of Chicago will serve to point out the conditions which the American railway companies in general are actively engaged in remedying, at a cost the magnitude of which is suggested by the fact that what is being done at Chicago alone in the way of track elevation, and without including the many other items which fall under the head of "betterment," comes, as shown above, to no less than \$33,500,000. The case of Chicago fully confirms the assertion I have previously made,

that the enormous expenditure now being incurred by the American railways on account of betterment is, to a great extent, simply bringing them up to the standpoint from which the British railways start, since it is certain that no railway in England would be allowed to enter a city of the dimensions of Chicago on the street level. It is, in fact, open to question whether the American railway companies are really warranted in dividing any substantial profits at all as long as their lines continue a source of so much danger to the public, and, independently of the pros and cons which arise on the question as to the reasonableness of raising fresh capital for betterment purposes, there seems to be every possible justification in the United States for the practice so widely prevalent there of devoting as much as possible out of revenue to the improvement of lines that are still so lacking in the quality of reasonable completeness.

IX

ACROSS THE PRAIRIES

It is not until one makes a journey west of Chicago that one realises to the full extent those primitive conditions in which, as I have already said, the American railways were originally started,—if not the enterprise of the railway pioneers in constructing them at all. East of Chicago one is never far removed from population for any length of time, and one finds four-track roads, or double-track roads, a certain number of over-bridges, level crossings that are protected more or less, and a considerable amount of betterment going on with a view not only to improving the lines, but to safeguarding the interests of the public. West of Chicago the general conditions are much less advanced.

My first experience of western travel—regarding Chicago as the dividing line—was a journey from Chicago to Denver, a trip of 1083 miles, by the Rock Island system. This meant the spending of two nights in the train; but in the comfortable Pullman cars—after one has got reconciled to the sleeping arrangements—

the time goes pleasantly enough, and the journey is one that offers an abundance of scope for those who wish to study American railway conditions. That the line is, in the main, a single-track one is a matter of course. In very few parts of the west is the traffic heavy enough to warrant the laying of a second pair of rails, except at passing points and in the neighbourhood of railway stations where sidings are necessary. There is one western railway system at least which has 6000 miles of track, but only about eighty miles of double track altogether. Then the wayside railway stations in the west are still more primitive than those in the east, and in many instances their interior cubic space cannot be very much greater than that of one of the expanded freight cars that pass them by on wheels. Still one cannot say that they are not big enough for the amount of business done, such business being, as a rule, mainly the transportation of live stock. As for unprotected level crossings, one comes to regard them as a matter of course. Out west the railways run through towns and villages, and across highways, without, in the vast majority of instances, the slightest attempt being made to protect people from being run over, except, it may be, in the display of a notice telling them to "look out for the trains." Even at Des Moines, a populous city 357 miles from Chicago, I noticed that quite a number of streets were crossed by the railway lines without even a notice board being displayed, and with nothing whatever to protect pedestrians and horses and carts passing

over the lines. As for over-bridges, I do not think there were more than three or four in the entire journey of over 1000 miles,—unless, that is, we passed them in the night time, or when I failed to observe them. Still, from all I could learn, these are the normal conditions of western lines in general, and not of any one line in particular. Everything possible is done to ensure the comfort and convenience of the passengers, from whom the railway companies derive revenue; but the people who walk or drive, and from whom, consequently, the railways get nothing, must look out for themselves. That is how the situation was summed up to me, half humorously, half seriously, by a certain railway official, and he added that when the lines were first put down the people were only too glad to see a railway laid at all, and were quite prepared to keep out of the way of harm.

From Chicago to Omaha, on the Missouri River, and for a good stretch beyond, the line passed mainly through the corn-belt district, as it is called, and the expanse of land devoted to maize crops was a sample, though a sample only, of the immense amount of territory over which the industry is carried on in this section of the United States. Here at least there seemed to be the opportunity for a good freight traffic for the railways.

But the appearance of things was very different when we reached the prairies. My acquaintance with them was made at Kanorado, on the morning of the third day of the journey. Considerable delay had been

caused owing to a freight train in front of us having got off the line, and at the time when we should have been at Denver we found ourselves only at Kanorado, some 180 miles short of our destination. There we had a further delay, for the locomotive of our own train had broken down, and it was necessary to send for another. The fresh engine would arrive in due course, but meanwhile the problem for the passengers was how they were to get breakfast. The dining-car had been cut off on the previous evening in the expectation that we should arrive at Denver at 7.45 A.M. and have our breakfast there, so that no provisions were obtainable on the train. The only thing to do, I was told, was to go into the "town" and get something. It was close at hand, and I should have time before the fresh locomotive came. Besides, the engine-driver should blow his whistle and warn me before he started. On that understanding I went into Kanorado—so called after the two States of Kansas and Colorado, the dividing line of which runs down the main street. Kanorado was the first prairie town I had visited, and I made an inventory of it. On the one side—that is, in the State of Colorado—there was an "hotel" (the most important building of all, at that moment, from my point of view), a combined post-office and store, and a store that was a store only. These were reached along some boards which represented the "side-walk." On the other side of the street—that is, in the State of Kansas—there was still another store, a dwelling-house, and some sheds. All the structures

were of wood. Such was the constitution of the town, but there were some scattered houses as well visible in the "suburbs," the total population of Kanorado being at least 50. This fact I learned from the landlord of the "hotel" while I was enjoying the well-cooked breakfast that the landlady and her daughter put before me. The local residents, it seems, live mostly from feeding cattle for the packers, and the place represented (as I found later) a fair sample of the prairie towns in general—towns, that is to say, where the passenger traffic would be small in the extreme, and where the freight would offer the only consideration deserving the notice of a railway company.

It was worth remembering, however, that many well-populated towns in the America of to-day have developed from just such primitive conditions as these. That is to say, they began with a handful of wooden dwellings and soon attracted still more people, who, as a matter of convenience, erected their houses on each side of the line. After a time a regularly laid-out town would spring up, the paths by which the inhabitants had crossed the meadows would become streets, and in due course those streets would have tramways, which would themselves cross and recross the railway on the same level. Then would come the question whether the railway company to which the town was indebted for its existence should consider itself morally bound to incur the expense of raising its tracks over the said streets, or whether the community ought not to run its



streets by subways beneath the lines. Assuming, too, that either ought to be done, when should it be carried out? One gets here, in a nutshell, as it were, the whole situation in regard to the level-crossings on American railways, and it is not altogether surprising to find that the general disposition has been to leave things alone as long as possible, and to take no action until a change becomes imperative in the interest either of the public or of the railway.

The general character of a prairie railway may be judged from the fact that for a distance of some hundreds of miles the train passed through no place that was inhabited by more than a few score of people. Every ten or fifteen miles there was a cluster of houses and farms dignified with a name on the railway map, and with a diminutive building alongside the line that served the purposes of a railway station. Otherwise there was nothing but boundless prairie, stretching out as far as the eye could reach, the monotonous level of the perfectly flat plains, with their covering of snow, mingling with the misty horizon. Often enough the prairie was all one could see—not a house, not a shed, not a sign of life, human or animal, not even a tree—nought but the eternal plains. Just as when, in mid-Atlantic, one looks around and finds nothing but a vast expanse of water, so, when one gazed here through the windows of the railway carriage, there was nothing to be seen but those enormous stretches of prairie.

To a visitor from overcrowded England the scene

presented by these hundreds of miles of continuous plains, with only an occasional oasis of civilisation, is impressive in the extreme, and I must confess that I could not but admire the enterprise of railway pioneers who had stretched their line of rail across these immense tracts of territory mainly in the hope of tapping whatever sources of traffic might lie beyond them. A certain amount of business is, it is true, got from the prairies, for a good deal of cattle-feeding goes on, especially in the background of the district through which we passed ; but it is the through traffic that is aimed at, and American railways will be built across 400, 500, or 600 miles or more of unsettled territory, from which little or no revenue can be derived, in the expectation of finding a promised land beyond. Such a journey as this constituted, in fact, an object-lesson in American railway making that I would not willingly have missed, and I felt thankful for the series of little mishaps which had delayed the train and had enabled me to cross the prairies in the daylight, instead of during the night, as we should have done had the train kept to time.

Soon after mid-day we reached Limon, a junction 89 miles from Denver, and a place that, happily for us, could boast of a station with a "lunch-room." Into that lunch-room everybody in the train went with one common accord, and inspired with one common feeling—hunger. The oft-quoted saying that "there are no class distinctions in America" is open to question ; but

there were certainly no class distinctions in that lunch-room. Pullman-car passengers and Pullman-car coloured attendants, conductors, brakemen, baggage-men, engine-drivers, stokers, and every one else connected with the train gathered around the lunch-room counter, and, side by side, fell to consuming the cold chicken, the hard-boiled eggs, the various forms of pie, and the other constituents of an American lunch displayed thereon, washing them down with the inevitable, but, in America, generally palatable coffee. Hunger satisfied, we had time to look around, pending the rearrangement of our own and the other trains in waiting. One of the first things I saw was a bill to the following effect, posted on a telegraph pole just outside the main building of the dépôt:—

LIMON LOTS FOR SALE

The town of Limon, Colorado, at the junction of two great railroad systems—viz., the Union Pacific R. R. and the Chicago, Rock Island, and Pacific Railway—has changed ownership. A party who has purchased recently over 20,000 acres of land in the vicinity of Limon, seeing the bright future for the best point between Denver and Central Kansas, purchased the entire site. A hint to the wise is sufficient. Choice lots for a time at \$25 to \$50 each.

This notification led me to feel a little more interest in the promising town of Limon than I should otherwise have done, and I made another mental inventory. On one side of the railway station I saw an hotel, a general

store, one substantial villa residence, three neat-looking wooden houses, a saloon, and a small collection of sheds. On the other side of the station there was a herd of cattle grazing in the foreground, beyond them stretched the prairies, and in the far distance were the tops of the Rockies, with Pike's Peak rising above them all, at a distance of 78 miles. I did not wish to question the wisdom and foresight of the gentleman who had "purchased the entire site" of the town of Limon. But all the same I did not put my name down for one of his choice lots.

Starting afresh from Limon we proceeded on our way to Denver *via* the Union Pacific, the other part of the train continuing to Colorado Springs. As we were late, the trains coming in the opposite direction had the "right of way" on the single track of road on which we travelled, and we had to stand off on the sidings occasionally, though when circumstances allowed we went along (as we had done at times on the Rock Island system) at a speed of 65 miles an hour. We reached Denver at last, nearly ten hours late on the journey of 1083 miles. Still, we got there.

And, getting there, I understood more clearly why it is that American railways are built for stretches of many hundreds of miles across the comparatively uninhabited prairie lands. Without counting what might be further west, here was as handsome, as populous, and as prosperous a city as one could hope to find in America, outside of such really great collections of

humanity as are represented by places like New York, Philadelphia, and Chicago. Denver is, indeed, the capital of one of the most promising districts in the whole of the United States—that of Colorado and the Rocky Mountains. America—if I may express an individual impression—is not merely one country, but a collection of countries, however strong may be the ties that bind the whole of them together. So it is that right across the continent which is called the United States, whether one travels from east to west, or from north to south, one finds a succession of different countries, as it were, each with its capital city, each about a day's journey from its neighbour, and each joined with the others by railways that are quite content to run any possible distance over more or less uninhabited regions, provided that they can get a fair share of the business which such capitals and their surroundings offer. The Atlantic that divides and yet unites Great Britain and the United States does not do either much more effectually than these vast prairies divide but still unite the eastern and the western States in America itself; and what the steamship has done in the one case, in maintaining a bond of unity and friendly intercourse between two nations belonging to the same kith and kin, that the locomotive has done in the other case, in ensuring a community of interest between the widely scattered, but still integral, parts of a single great nation.

Denver itself was only organised as a town in 1858,

and as a city it represents the growth of little more than about three decades ; yet to-day it has a population of 150,000. As a commercial centre for the great and varied industrial interests carried on in the State of Colorado, and as a centre, also, for the large and increasing number of people who visit the Rocky Mountain district for health or pleasure, Denver occupies an exceptionally favoured position, and, under the operation of the irrigation schemes now projected, or in process of being carried out, for storing the waters of the Rockies, and utilising them for the conversion of arid plains into fertile districts, that position is likely to become still more favourable. One cannot be surprised, therefore, that some half-dozen different railroads should be stretched across the prairies, either to tap such a district as this directly, and go no further, or to pick up, here or elsewhere in the State, a share of its transportation, while going still further west. The railways that were built in hope years ago, anticipating the growth of the country later on, are thus at last getting their reward. But, after seeing the hundreds of miles of undeveloped lands passed over by these railways before the profitable oases are reached, the English visitor, who may at first be inclined to criticise from an English standpoint, learns to be more tolerant. He sees for himself that the cost of constructing such railways according to the standard of perfection enforced in his own country would have been prohibitive, and he finally concludes that it was as well, after all, that railway pioneers in America

were left to build their lines in their own way, and in one that was certainly most in accordance with the particular conditions in which they found themselves placed, and best calculated to lead up to the increased national prosperity that is now being experienced.

X

IN THE ROCKIES

IN strong contrast to the very simple and comparatively inexpensive construction of the railway lines over the prairies are those that run in or across the Rockies. The Denver and Rio Grande, for instance, starting from Denver—which city is already at an elevation of 5197 feet—rises to 7237 feet at Palmer Lake, a distance away of 52 miles, this rise of over 2000 feet being so gradual as to be imperceptible to the passengers. Between Palmer Lake and Pueblo, 67 miles further south, there is a drop to 4668 feet. From Pueblo to Leadville the distance is 156 miles, and there the altitude reached is 10,200 feet. The line then drops down to 9500 feet before it rises to 10,240 feet in crossing the Tennessee Pass, *en route* for Grand Junction, Salt Lake City, and Ogden, this being the main line of the Rio Grande, and now of standard gauge throughout. From Salida, a station 96 miles west of Pueblo, there is a narrow gauge branch which joins the main line at Grand Junction. It crosses the Marshall Pass at a

height of 10,856 feet, the line rising no less than 3806 feet in the 25 miles between Salida and the summit of the pass. The maximum gradient of the standard gauge on the main line is one of 156 feet in the mile, and the maximum curvature is 12 degrees in 100 feet. The speed attained in ascending so considerable a gradient is one of from 15 to 18 miles an hour. To accomplish this result a passenger train will, in the busy season, be cut in two at the bottom of the pass, and each half will be drawn to the summit by two engines, the separate halves being rejoined at the top and taken down the other side by a single locomotive. On the Tennessee Pass (which forms the Continental Divide, the streams on the one side flowing into the Atlantic and those on the other flowing into the Pacific) there is a tunnel 2740 feet long, constructed at a point only 178 feet below the actual summit of the pass, the elevation of which is 10,418 feet.

The passenger engines employed on the standard gauge are of a 10-wheel compound type, with small cylinders 15½ inches, large cylinders 26 inches, and a 26-inch stroke. The diameter of the driving wheels is 63 inches, and the total weight of an engine, without tender, is 178,640 lbs. The engine will carry 18,000 lbs. of coal, and 6000 gallons of water. The largest freight engine is one of consolidated type, with driving wheels only 53 inches in diameter, and the total weight of the engine is 188,090 lbs., the tank capacity in regard to coal and water being the same as the passenger

engine. On the narrow gauge the passenger engines are of the 10-wheel type, the diameter of the cylinders is 14 inches, with a 20-inch stroke, the diameter of the driving wheels is 46 inches, and the total weight is 60,000 lbs. The engines carry 10,000 lbs. of coal and 1000 gallons of water. Of the freight locomotives on the narrow gauge as many as three will sometimes be used to draw a mineral train up the mountains. These engines are of a consolidated type, and the cylinders are 16 inches, with a 20-inch stroke. The diameter of the driving wheels is here still further reduced to 36 inches (the reason for this being, of course, to allow of those wheels getting the firmest possible grip on the metals), and the total weight is 66,300 lbs. The engine carries 14,000 lbs. of coal and 2500 gallons of water, and such is the consumption of coal on some of the mountain ascents that an engine will burn about $2\frac{1}{2}$ tons in climbing $17\frac{1}{2}$ miles on the west side of the Marshall Pass, and 3 tons in climbing 26 miles on the eastern side. The gradient of the narrow gauge line over Marshall Pass represents a rise of 211 feet per mile, and there is a curvature, in places, of 24 degrees in 100 feet. So pronounced and so serpentine are these curves that when looking through the carriage window the passenger will at one moment see the locomotives and several front coaches curled around on one side of the line, and almost the next moment, without changing his position, he will see them through the windows on the other side of the train. Snow is a

less serious difficulty on the mountains than it is in the valleys and on the plains. Where trouble is likely to arise it is surmounted by the provision of snow sheds. As for the possible risks in descending such gradients as those described, these are reduced by the fact that the brakes are applied for nearly the whole of the way in order that no undue speed shall be attained. Altogether, it is considered that there are fewer accidents on the mountain railways than there are on the ordinary lines, the reason given being that the men employed on the trains are of exceptional skill and experience. They also receive a higher rate of pay than those on the eastern lines. At the same time, the freight and passenger rates charged to the public are higher than is the case with other railways, the rates for gold and silver minerals ranging from \$3 to \$20 a ton, with \$3 a ton for coal, coke, and iron ore; while the average local passenger rates on all the narrow gauge systems are 6 cents per mile, though in exceptional instances on mountain railways in America they rise to as much as 20 cents per mile.

As a further indication of what the building of these mountain railways involves, I may add that the Colorado Midland Railway, which crosses the Rockies from Denver to Grand Junction, and at Leadville rises to a height of 2 miles above the sea-level, goes round, at one point, 14 miles in order to descend half a mile.

The views of the average Englishman on the subject of Rocky Mountain railways—assuming that he has

any special views on the matter at all—are probably that the main purpose they were to serve was simply to aid in providing a through route right across the American continent from New York to San Francisco. But when the construction of the Denver and Rio Grande was begun in 1871, with the building of the first section from Denver to Colorado Springs, the aspiration was that, in serving local purposes, the company would also start a railway which would be continued to El Paso and the Rio Grande river, and connect with the City of Mexico. It was to be a narrow gauge railway throughout, and 30 lb. rails were used. Then in 1876 and 1877 came the excitement following the discovery of carbonate silver ores in the vicinity of Leadville. There were then no railways within twenty miles or so of that place, but so intense was the anxiety of fortune-seekers to be among the first to get into Leadville that companies were organised for the running of six-horse coaches from Denver, Cañon City, and Colorado Springs, these coaches being run with an absolute disregard for the lives of the mules employed, so that the road became well defined by the carcasses that lay alongside, while hundreds of people walked the entire distance. All this gave to the Denver and Rio Grande an opportunity for distinguishing itself in the particular *role* it was destined to play. The inclusion of its system in a great trans-continental route came later ; but the great and immediate purpose that the Rio Grande and the various other railways in

the Rocky Mountains have served has been in the development of the country.

It was the same *rôle* as that which was already being played in the prospective agricultural districts, but it involved far higher degrees both of skill and of enterprise. The lines on the plains were arranged on so simple a basis that, as a rule, any ordinary labourer could lay them; but those upon the mountains called for the highest degree of engineering skill. The work of extending the Denver and Rio Grande to Leadville presented what seemed to be insurmountable difficulties, especially in the Royal Gorge, otherwise known as the Grand Cañon of the Arkansas. The line followed the course of the stream, but in some places the rocks which tower up on each side of the gorge are so close together that the embankment for the railway had to be laid in the very bed of the river. There is one spot where the available space will not allow even of this arrangement, and the line runs across a hanging bridge which is supported over the raging current by bent iron beams driven into holes in the rocks on each side of the stream. The extension to Leadville was followed in later years by branch lines in many other directions, for no sooner was a new mining district opened, or on the point of being opened, than it was followed by a line of railway which would bring the mineral products down into the valley, and convey supplies to the settlers. The more that Colorado was explored the more it was found to contain almost every mineral in

paying quantities, and the important part that the railways filled in not only providing transportation for the supplies, but for securing the conversion of mining camps into permanent towns, and in settling large areas of territory, is beyond all question. They served the further purpose of attracting great crowds of tourists and health-seekers to a district where the wild and rugged picturesqueness of a succession of imposing cañons, and the grand views of mountain summits obtained from the railway carriages in crossing the mountain passes, afforded scenic effects of almost unsurpassable grandeur; while the dry and clear atmosphere in the high altitudes led to the creation of a number of health resorts which have every year been increasing in popularity. In this respect the attractions both of Colorado Springs and Glenwood Springs, each situated in the midst of most beautiful surroundings, and each having its own special claims to tourist patronage, are undeniable.

Thus one sees that if the American railway pioneers showed their splendid audacity, not only in stretching their lines across prairies and unsettled districts generally, but also in constructing a perfect network of them in such a territory as that which I have described, they have not done so without hope of reward; though it must be evident that in the case of the Rockies, as in that of the prairies, there is no possible room for comparison between American and British conditions. Of the individual industries which have been developed

in Colorado none is more striking than that of the Colorado Fuel and Iron Company, whose operations, together with those of various other concerns, are rapidly leading to the transformation of Colorado into a Pittsburg of the west. At its Pueblo works the Colorado Fuel and Iron Company produced, for example, in 1902, 482,000,000 lbs. of pig iron, 17,000,000 lbs. of spiegel, 312,000,000 lbs. of steel rails, 129,000,000 lbs. of merchant iron and steel, 27,000,000 lbs. of castings, 90,000,000 lbs. of iron pipe, and 25,000,000 lbs. of spikes, bolts, and nuts; while the production of iron ore amounted to 1,029,000,000 lbs. Most of these totals show a very substantial increase on the figures for 1901 and 1900. The company now employs 15,000 men, as against 11,000 in 1901, and 8000 in 1900. During 1903 improvements and extensions will be carried out which will involve a further expenditure of \$15,000,000, and will treble the producing capacity of the concern. In addition to its extensive iron and steel works, the company owns and controls more than 576,000 square miles of coal lands, which is about 100 square miles more than the sum total of the coalfields of Pennsylvania; and it also has extensive limestone quarries within easy reach both of its ore supplies and of its furnaces. The estimates of competent authorities put the coal deposits of Colorado at 18,000 square miles. Of collateral industries connected with the coal and steel trades a large number are now being set up at Pueblo and elsewhere in the district, some

of them being concerns of very considerable importance.

Of no less value both to the State of Colorado and to the railways are the agricultural developments that are proceeding there. The beet industry has made immense strides in Colorado of late years, and fruit-growing on the western slopes of the Rockies has been successful in the extreme. But these are simply the beginnings of changes that will lead to Colorado becoming one of the most successful of the American agricultural States. Situated in the arid region, Colorado is absolutely dependent on irrigation for whatever she grows, but the results already achieved in this direction have encouraged the making of efforts far in excess of anything yet attempted. The most advanced of Colorado's citizens are looking forward to the time when the streams which are produced there by the melting of the snow that falls on the mountains will all be stored and devoted to the fertilising of the soil. At present only about 2,000,000 acres in Colorado are under cultivation by means of irrigation canals. It is estimated, however, that in this one State alone there are 40,000,000 acres which could be devoted to agricultural purposes, if only there was water available, and there is said to be enough water now running through the State to reclaim at least from 10,000,000 to 12,000,000 of these acres. So the people of Colorado are full of schemes for building storage reservoirs, making thousands of miles of canals, and even boring tunnels through

mountains in order to divert rivers into districts which would then become the finest of farming territory. The outcome of such schemes as have already been decided on will be to reclaim in Colorado, through the joint efforts of Government and State, millions of acres that are now little more than barren wastes, and those who years ago showed their confidence in the future of the State should eventually reap an abundant harvest.

XI

A MINING CAMP RAILWAY IN COLORADO

THE story of the wonderful little line of broad-gauge railway that runs from Colorado Springs over the mountains to the mining camp of Cripple Creek is a romance in two chapters, falling respectively under the head of "A Romance of Discovery" and "A Romance of Railway Engineering."

Little more than ten years ago the gold-mining district of Cripple Creek, Colorado (which, down to the end of 1902, had produced gold of an estimated value of nearly \$143,000,000, and has within its area a number of well-populated towns), was represented by a cow-pasture. The site on which the town of Cripple Creek itself, with its 10,000 inhabitants, now stands, was a homestead belonging to two men, named Womack, father and son. They had mortgaged it to a Denver firm, but could not even pay the interest, and the firm foreclosed, the site in question, together with other properties which had been added to it by the Womacks, becoming part of what was known as the Broken Box

ranch. The father then left the district, but the son, Bob Womack—to give him the name by which he is known—remained on at the ranch, doing work there in return for his board and lodging. He was regarded as a bit of a crank, for he had a fixed idea that gold could be found in the neighbourhood, and, instead of devoting his attention to looking after the cattle, he spent most of his time in digging holes in the ground, searching for traces of gold. The manager of the ranch made complaints about him to the owner, alleging not only inattention to duty, but that every hole dug on the ranch meant the loss of a steer. So the ranch-owner went to interview the gold-seeker, and found him in still another hole which he had made. But when Womack gave him a bag of samples, and invited him to have them tested, the ranch-owner refrained from scolding, and decided to send the samples to Denver. For some unaccountable reason the Denver assayer declared there was no trace of gold in the rock; but the humble cattle-tender proved himself a better judge than the presumed expert, for the hole from which he had taken the samples was afterwards found to contain some of the richest ore in any part of the district. Stimulated always by his fixed idea, Womack continued his tireless search, and at last, in what was known as Poverty Gulch, he located the El Paso claim, now known as the Gold King mine. His first waggon-load of rock from this claim brought him returns to the amount of \$140; but he afterwards sold the claim for

\$300, and it got into the hands of Messrs. Lennox and Giddings, to whose persistence in proving that the mine in question was a good producer was due the fact that the district began to acquire more than a local fame. Up to July 1901 the mine which Womack sold for \$300 had paid over \$262,000 in dividends. To-day Bob Womack, the discoverer of Cripple Creek, from which so many people have made big fortunes, helps his sister to conduct a boarding-house in Colorado Springs.

The earliest finds at Cripple Creek did not excite the world at once, for there had just previously been two rushes, each of which had proved a delusion and a snare, and people did not want to run the risk of a third disappointment. To begin with, therefore, Cripple Creek was left to amateur prospectors; but a succession of important discoveries led to a number of claims being started, and soon the district became the scene of considerable activity. Before long, too, there were developments still more startling than any that had gone before. There had settled at Colorado Springs, in 1872, a certain Winfield Scott Stratton, a carpenter by trade, but a man who, though getting his living at his humble calling, spent his nights in poring over books which dealt with the subject of mining, and his leisure days in studying on the mountain sides the formation of rocks. He, too, like Bob Womack, had his fixed idea, and for no less a period than twenty years he continued his studies (taking a regular course in assay-

ing at Colorado College) and also his prospecting, until he reached a stage when he found himself not only without means, but heavily in debt. Then, in 1892, he located the Washington and Independence mines at Cripple Creek. He applied himself to the development of the former, and granted a two months' lease of the latter claim to some parties who, in that time, netted \$150,000 from it. Selling the Washington claim for \$80,000, of which he received \$10,000 in cash, Stratton paid away \$8000 to his creditors, and found himself left with a balance in ready money of \$2000. He took over the Independence mine on the expiration of the two months' lease, and he developed it with such advantage that eventually he sold the property for \$10,000,000.

The midnight student and once penniless prospector thus found himself a millionaire; but his wealth seems to have brought him little real happiness. He is reported to have said to an intimate friend at Colorado Springs:—"I once gave an option on the Independence and Washington mines for \$125,000, and a thousand times I have wished that the holders had taken it up, for then I would have retired from mining, and lived on that money. Too much money is not good for any man. I have too much, and it is not good for me. A hundred thousand dollars is as much as any man should have if he would be happy and free from the bitterness and heart-aches that come with great wealth." So worried was he in the closing years of his life by

beggars, black-mailers, and would-be exploiters of all descriptions, that he became almost a recluse from his fellow-men, and the only real source of happiness he found open to him was in planning a philanthropic scheme under which the wealth he had acquired was to be devoted to setting up a home for persons less successful in life than he had been himself. It was while still engaged in maturing these plans, in 1902, that he died.

Meanwhile the town of Cripple Creek had been steadily developing. Its first post-office, as related in the *Cripple Creek Times*, was a log cabin, with a roof of poles and earth; and twelve "boxes," in which letters for callers could be placed, were arranged by fixing partitions in a biscuit box, the said post-office being also the first store of the new town. Cripple Creek was incorporated in February 1893, and such was the growth of the place that by 1896 it had attained to considerable proportions. Then a serious disaster occurred, for the overturning of a gasoline stove started a fire that spread rapidly among the wooden structures of which the town was composed, damage being caused to the extent of \$1,000,000, while 3000 people were left homeless. But a new and better town, with an abundance of substantial brick or stone structures, speedily arose on the site of the one destroyed, and to-day Cripple Creek is not only a thriving city, but the capital of a district covering thirty-six square miles, including a number of well-organised com-

munities, and representing one of the most successful gold-mining areas in any part of the globe. The total output for 1902 was estimated at \$21,427,000, and a number of new discoveries were made during the year which strengthen the conviction that the prosperity of Cripple Creek will continue. The chief concern, at present, arises from the presence of water in the mines; but deep tunnels are being cut (some of them will be from one to two miles in length) in order to secure an efficient drainage, and in this way it is hoped that the trouble will speedily be overcome.

Such is the transformation scene that has taken place on the lands where, only a decade ago, the Womacks, father and son, pastured their cattle, and a profoundly interesting place to visit I found it to be. But no less interesting was the journey there over the Colorado Springs and Cripple Creek Railway, known locally as the "Short Line to Cripple Creek."

How this line came to be made is worth mentioning, as it throws a little light on the peculiar conditions of American railways in general. Two railways to Cripple Creek had already been constructed,—the Florence and Cripple Creek, opened in 1894, and establishing a direct connection with the Denver and Rio Grande system; and the Midland Terminal, which reached Cripple Creek in November 1895. These two lines seemed to answer the requirements of the district in regard to the transport of minerals, etc., and the ordinary local traffic, while the competition between

them kept down the rates to a reasonable level—from the point of view of the mine-owners. But the two railway companies combined, and new bonds were issued representing a very substantial advance on the original cost of the roads. At the same time the rates for freight began to rise, and the leading mine-owners, fearing that it was they who would have to pay the interest on the increased investments, resolved to become independent of the combination by constructing a railway of their own to Colorado Springs. With such energy was the work carried out that the line was opened for traffic on April 8, 1901, within a little over one year from the time of the start.

The new railway is a broad-gauge line, without the cog-wheel arrangement generally associated with mountain railways, so that any ordinary passenger car or goods waggon can be taken to Cripple Creek from other lines, or *vice versa*, without the need for change of carriage or transhipment of freight. It differs, too, even from other broad-gauge mountain railways in America, inasmuch as it makes no attempt to follow the streams, but goes boldly along the mountain sides, rising high above the valleys, twisting and turning on the peaks and summits on one side of a valley, and then suddenly crossing the end of that valley, on wooden trestles or an embankment, in order to continue its serpentine progress along, over, or through the mountains on the other side. In this way the line will pass along narrow ledges where there seems to be



hardly enough space for the track, or across yawning chasms on a wooden framework to which a nervous passenger might, at first, feel reluctant to entrust himself. From time to time one sees the continuation of the track far above on the opposite side of a broad valley, and one wonders how the train will get there. But get there it does, in due course, and a height of 9917 feet above the sea-level is reached at the summit of the line, 21 miles from Colorado Springs. Allowing for the elevation of Colorado Springs itself, this represents a rise, on a uniform grade, of 3917 feet in the distance stated. Cripple Creek is eventually seen spread out in a broad plain in the hollow of the mountains, though the city is still at an altitude of 9396 feet. By the time the train reaches the end of its journey it will have gone a distance of 45 miles to reach a point which, as the crow flies, is only 21 miles distant from Colorado Springs. The time occupied is about two hours and forty minutes.

In the construction of the line none of the economies were practised which have been characteristic of so many railways on the plains. There was the certainty of a profitable business as soon as the line was ready, while a railway such as this required that everything should be of the very best. No fewer than 3200 sleepers were laid to the mile, this being 500 per mile in excess of the average on ordinary American lines; 75 lb. rails were used, and the ballasting was such as to make a perfectly hard and solid road-bed. As for

the locomotives, they were the very best for the purpose that could be got in the United States, and, after going over the line, I can only say that the train seemed to run not only quite smoothly, but with no more apparent effort than if it had been passing over the flattest of prairies. The cars are of the ordinary American corridor type, with an open observation section at the end of the last one of those forming the train. The total cost of line and equipment was about \$4,000,000, and practically the whole of this sum was raised in Colorado Springs, local patriotism emphasising the fact that the line was paid for "with Cripple Creek gold."

The Short Line was really constructed to serve the special purposes of the mines, and without much thought of attracting general traffic. But the daring nature of the engineering feat which it represents, and more especially the extreme grandeur of the scenery that is passed through, soon won for the route a degree of tourist patronage which came as almost a revelation to the owners. Bold and rugged peaks and long ranges of mountain summits alternate with beautiful natural parks or picturesque landscapes, which, as I saw them at the time of my winter visit, stretched out far and wide with their covering of snow, while in the clear Colorado atmosphere distant objects seemed near at hand, and small details stood out with a distinctness that in itself was a marvel. To get such a panorama of scenery in high altitudes while seated in a comfortable railway carriage is a form of mountaineering that has

appealed strongly to the American people, and the success of the line in regard to its patronage by the general public has been complete. The railway company is now proposing to follow up this initial success by erecting hotels from point to point, and otherwise developing the district as a pleasure and health resort. Already, in fact, the trip by the Short Line to Cripple Creek has attained to the same distinction in Colorado that the ascent of the Rigi holds in Switzerland, with this difference, however, that the line to Cripple Creek takes one in and out, along the sides, and across the peaks of a number of mountains, thus affording a greater variety of scenery than is the case where only a single mountain is ascended; while it also takes one not merely to an hotel and a view, but to one of the youngest, most enterprising, and most successful of communities, engaged in their mountain home in adding to the wealth of the world, and in working out among themselves the social problems inevitable to the rise of a city that has come into being with a suddenness so dramatic.

XII

THE SANTA FÉ TRAIL

IN the story of "The Santa Fé Trail"—now absorbed in the system of the Atchison, Topeka, and Santa Fé Railway, which I struck at Trinidad, Colorado, on leaving there the lines of the Denver and Rio Grande—there is comprised a short history of internal communications on the American continent which is not only of great interest in itself, but serves to show how the creation of the railways of the United States has taken place under conditions with which there can be no possible comparison in the United Kingdom.

For the beginning of the story one must go back to the early days of the Spanish settlement in Mexico. In exploring to the north of their newly-acquired territory, the Spanish adventurers of the sixteenth century came across some very attractive lands in the Rio Grande valley, where no fewer than seventy villages ("pueblos") of Indians were then established; and on the return journey a number of the troops, reluctant to leave so pleasant a spot, remained behind, and

founded the city known to us to-day under its abbreviated title of Santa Fé, the name originally given to it being "La Ciudad Real de la Santa Fé de San Francisco" (the True City of the Holy Faith of St. Francis). So Santa Fé became an advanced outpost of Spanish civilisation in the land of the heathen, among whom the friars of the Order of St. Francis worked with all the zeal in their power to change them into good Catholics.

But Santa Fé was 1500 miles from the seat of Spanish supreme power in Mexico, and this fact had two results: It not only allowed the local governor to become almost a sovereign ruler, but it rendered extremely difficult the securing of clothing and other necessary supplies. The only route then available for such supplies was by sea to Vera Cruz, across country to the City of Mexico, thence over a long and difficult road to what is now El Paso, and, finally, by half-yearly caravan along the valley of the Rio Grande to Santa Fé. The final outcome of these difficulties was that by the time common calicoes and plain cotton goods reached Santa Fé they were worth from two to three dollars a yard.

While the Spanish had thus been pushing forward their dominions northward and eastward, the Pilgrim Fathers and those who succeeded them had been pushing out westward. In 1811 the then young republic resolved to spend a large sum of money in opening up a road which, starting from Cumberland (Maryland),

was to continue almost due west through Maryland, Pennsylvania, Ohio, Indiana, and Illinois, to St. Louis, a distance of something like 700 miles. Though never fully completed, this road gave to St. Louis the paramount position it once held—that is to say, prior to the rise of Chicago—as a collecting and distributing centre between east and west. Thus the line of civilisation already sent out from Mexico was stretching towards a similar line pushed out from the shores of the Atlantic; but between the two there was a vast expanse of desert land which was not to be effectually bridged over until, in the nineteenth century, the railway accomplished its beneficent mission.

Already, in the early days of the century, some adventurous spirits had crossed the intervening plains and mountains, and, whether by chance or design, had come upon the Spanish settlements in what is now New Mexico; but it was not until 1812 that the first trading expedition was sent there from the east. Owing to the political troubles then prevailing, the merchants were looked upon as American spies; they were deprived of their goods, and they themselves were thrown into prison. Another expedition in the same year almost perished from thirst on the waterless plains. Others followed, and these were so successful, and secured such large profits from the settlers—to whom they were able to sell at rates substantially below those charged for goods brought from the City of Mexico,—that a regular trade soon sprang up. Down to the

year 1824 all the merchandise taken to Santa Fé from the east was conveyed there on mule back; but in that year a new departure was made in the employment of waggons (drawn either by oxen or by mules, the latter representing "express"), and the organisation of regular caravans.

By that time the point of departure had shifted from St. Louis to Westport or Independence, near to what is now Kansas City. The merchandise was conveyed from St. Louis along the Missouri to the points in question, a considerable saving in transport being thus effected. Fort Leavenworth also became an important point of departure, especially for military stores. In 1824 the value of the goods thus carried across the plains was \$35,000; the number of waggons employed was 26, and the number of men in the caravans was 100. By 1843 the value of the merchandise had increased to \$450,000, the number of waggons to 230, and the number of men to 350. The average duration of the journey to Santa Fé was 70 days, and the return (when the waggons had comparatively light loads) was made in 40 days.

The journey was thus tedious enough, but it was dangerous as well. While the "pueblo" or village Indians were well disposed towards the traders, there were tribes of nomads who were ready at any time to attack any small party of travellers, not only plundering them of their goods, but killing the travellers themselves under circumstances of the most atrocious

cruelty. Many a deed of horror of this kind occurred; and still more massacres were only avoided by the formation of large well-armed caravans, organised under a captain and lieutenants, and protected at night by a regular "fort" of waggon, each individual member of the caravan being required to go on regular guard duty. As the merchandise carried increased in value, the temptation offered to the bands of Indian marauders became greater, and the attacks, or threatened attacks, were alarmingly frequent. Appeals were made to the Government for military aid, and the caravans were then sent out in the charge of troops; but, in spite of all these precautions, disasters occurred from time to time, and a merchant with whom I conversed at Las Vegas recalled some ghastly scenes of which he had been a witness in his early days.

The principal route followed by the caravans was across the Raton Pass, and it is this route that became especially known as "The Santa Fé Trail." After a gradual rise all the way from the Missouri, the trail here began a stiff ascent over a mountain pass having an elevation of 7600 feet; and a cute American of those days took over practically the whole of this pass as a "homestead," improved the roads, and then levied a toll on every vehicle that passed through what he was pleased to regard as his own property. Such toll was collected until the Santa Fé railway, which follows the trail and crosses it at times, bought up the "right of way"; but the remains of the old toll-house are still

to be seen alongside the line. In course of time the caravans of the merchants along the Santa Fé Trail were followed by stage-coaches, which did the entire journey from Kansas City to Santa Fé in a fortnight. Regular stopping places were set up where meals could be got, and there were still more frequent places where the horses were changed; but the travellers had to sleep as best they could in the coaches, and for the entire fortnight they had no chance of going to bed.

While the Spanish settlers had welcomed the earlier traders because they were able to purchase goods from them at a much lower rate than they gave for those from Mexico City, the price of commodities in New Mexico were certainly high enough, from our present-day standard, even as late as the sixties. In 1865, for instance, lamp oil sold at Las Vegas at \$5 the gallon; flour at \$20 the sack of 100 lbs.; coffee at \$1.50 per lb.; sugar at \$1 per lb.; rice, 50 cents per lb.; and soap, \$14 per 60 lbs. A single box of matches cost 50 cents. For an overcoat \$50 had to be paid; for a good suit of ready-made clothes, \$75; and an ordinary quality of bleached muslin sold for 50 cents the yard. Blankets cost from \$10 to \$18 the pair; a two-ounce packet of tin tacks cost 75 cents; and the commonest kind of whisky fetched \$2.50 the bottle. It was, however, the people in general rather than the merchants who suffered from this state of things. The merchants ran their risks, of course; but one gets the impression

that they found the business profitable rather than otherwise.

The actual transportation from the Missouri to New Mexico drifted into the hands of two firms—a larger amount of capital being required than the ordinary trader would be able to find, or would care to jeopardise,—and these two firms became the “carriers” both for other firms and for the Government. As the railways began to stretch out from the Missouri the starting-point for the caravans would be removed further west, the carrying firms setting up afresh their eastern *dépôt* in each instance at the station that represented “end of track.” Thus, when the Kansas Pacific Railroad (now the Union Pacific) began to build across the plains to Denver, it was followed from point to point by the carriers, who, however, changed over to the Atchison, Topeka, and Santa Fé when the latter stretched out in a more direct line to New Mexico.

As the distance between the railway and the New Mexico capital thus diminished, it was possible to have more caravans in the year; but, whatever the actual number, the last of the ox-teams would reach Santa Fé in September, and the last of the mule-teams in October. From that time until the following July practically no more supplies came to New Mexico, and the retail purchasers were then left to the tender mercies of the traders who controlled the market. The high prices, however, were not entirely due to the

cost of transportation or to the desire of the traders for a good profit, for the Government had levied duties on the goods equal to from 50 per cent to 100 per cent of their value. One governor hit upon the idea of taxing every waggon \$500, irrespective of size ; but the traders met this procedure by constructing waggons of such large dimensions that the governor found it to his advantage to return to the *ad valorem* plan.

Little by little the railways crossed the plains where the Navajoes, the Apaches, and the Utes had carried on their warfare against civilisation, and where, as one trader, indulging in reminiscences, put it to me, "you could sometimes see nothing but one vast mass of buffaloes, without a single break." Even as late as 1870 the Indians were a source of considerable trouble on the Santa Fé Trail.

At last, in February 1879, the Atchison, Topeka, and Santa Fé crossed the Raton Pass, where there is a gradient of 225 feet in one mile. The first train entered Las Vegas in the following July, and Albuquerque was reached in 1880. For engineering reasons the main line was made to diverge to the south of Santa Fé, to which a short branch line was constructed from Lamy. But this was a matter of detail. The fact remained that the railway had absorbed the trail, and had opened up for New Mexico an era of progress and prosperity far in excess of anything that had been achieved for her in the whole period of 275 years that had elapsed since the Spanish flag was first raised in the now

United States city of Santa Fé. A land that had slumbered and slept, or had done no more than just supply her daily requirements throughout the centuries, awoke to new life. Now that a journey which once took a fortnight even by stage-coach, or seventy days by ox-team, could be made comfortably by train in a day and a night, there was a substantial migration to a district where the mineral wealth was great, where irrigation alone was needed to cause the desert to become abundantly fertile, and where the dry and clear atmosphere promised a fresh lease of life to sufferers from pulmonary complaints who could not endure the moist temperature of the eastern States. So the existing cities began to expand; brick buildings supplemented the low adobe structures,—made with sun-dried mud-blocks,—which were previously alone to be found there (at Santa Fé itself there was not a single two-storey house until the advent of the railway); mines which the Indians had filled up or closed down when, in 1680, they revolted against their Spanish taskmasters, were reopened; new industries were introduced, and valleys where hitherto silence had reigned supreme became populated and helped to enrich a country which had seemed to be lagging behind in the general progress of the United States.

It is nothing short of a social and economic revolution that has thus been brought about within the short space of a single quarter of a century, and one hears on every hand throughout New Mexico of the

marvels that those narrow streaks of iron, stretched from river to plain, from plain to mountain summit, and from mountain summit to cities and villages, have brought with them. All this has meant, too, not only prosperity, but civilisation ; for railroads and Indian raids could not exist together, and to-day those of the Indians who survive are kept out of harm's way in reservations where, indeed, they seem to be as well contented with their lot as, in the nature of things, one can expect them to be.

So it is a great work that the railway has accomplished. The Spanish conqueror may have done heroic deeds with his sword, but it was left for the humbler railway navvy, working with pick and shovel, to convert New Mexico into a land of abundant promise and of practical utility to the world at large.

The advent of the Atchison, Topeka, and Santa Fé Railway to Albuquerque was followed by the construction of a new line between that point and the Pacific coast, and this was subsequently combined with the Santa Fé system, so giving a new trans-continental line between San Francisco and Chicago, the present starting-point of the Santa Fé system on the east. Thus the trains that now cross the Santa Fé Trail have a much more important duty to discharge than that of simply meeting the wants of the dwellers in New Mexico, and no one can stand in the goods yard at Las Vegas, for example, and see the long freight trains that pass through from the Pacific coast on their way to the

east without being impressed by the magnitude of the trade that is carried on.

It is still more impressive when one turns from old engravings showing patient oxen or mules passively waiting on the Santa Fé Trail while their owners are fighting with the Indian savages for the right of way across the plains, to a close inspection of such a locomotive as that which I saw in the railway round-house at Las Vegas, and representing the largest type of engine by which merchandise is taken to-day across the aforesaid trail. Here was a "Decapod" which represented a weight on driving wheels of 232,000 lbs., without tender, and a total weight, with tender, coal, and water, of 440,000 lbs. The ordinary type of double-compound prairie engine, two of which now pull a passenger train up the Raton Pass, was to be seen there as well. It has a total length of 81 feet, and a total height from rails to the top of cab of 13 feet 6 inches. Its weight is 220,000 lbs., including tender, and, as compared with the ordinary type of engine in use on British lines, it looks a perfect monster, if not, indeed, a perfect monstrosity. But though an American locomotive is far from being a thing of beauty, especially when it is in working condition, it nevertheless gives one an idea of almost illimitable strength.

When, as I have here sought to do, one recalls such a story as that of the Santa Fé Trail, and contrasts past with present, one begins to realise more than would be

possible from statistics alone the immense advance that has been made on bygone conditions ; but they are conditions peculiar to America, and the example I have here offered has absolutely no counterpart either in Great Britain or elsewhere on the habitable globe.

Of the Santa Fé route as it exists to-day I can only add that it presents an abundance of points of interest for the traveller in America. New Mexico and Arizona, with their strong contrasts of old Mexican towns and new American enterprise, of prosperous settlements and arid deserts, their glimpses of Indians and Indian villages, their exhilarating atmosphere and their delightful health resorts, are States in which the visitor would fain linger, for they are fascinating in themselves, and offer attractions very far different from anything to be found in the eastern States. As for the Grand Cañon of Arizona, to my mind it far surpasses in grandeur and sublimity even the Falls of Niagara, and constitutes a still greater "wonder,"—one, indeed, which it would be worth the while of any one who visits the United States to go across the American continent to see.

XIII

THE TRANS-CONTINENTAL TRAFFIC

It is a noteworthy fact in the history and development of American railways that the first line which established direct communication by rail with the Pacific coast, with all its great consequences to the world, should have been the outcome of the private enterprise of some half-dozen comparatively obscure merchants in the city of Sacramento, California, who, to begin with, knew nothing of railways, and of whom it has been said that, had they been railway men, they would not have attempted the apparently impossible enterprise which they nevertheless carried to a successful issue.

When, in 1861, these said merchants organised the Central Pacific Railroad Company (afterwards the Southern Pacific) the aim they had in view was the construction of a railway from Sacramento to the eastern limit of California, or some point beyond, where it would meet and combine with one to be constructed westward from the Missouri river by what is now the Union Pacific Company. This meant the building of

a railway across the Sierras, where the ascent from the west over apparently solid walls of granite represented a rise of 7000 feet in 83 miles, and where the rails would have almost to cling to the sides of the precipices; and it meant, also, passing across desert lands where the population was at one time so scarce that between Reno and Corinne, a distance of 665 miles, there lived only a single white man.

But the Sacramento merchants, encouraged by a civil engineer of the same city, Theodore D. Judah, who had thoroughly explored the mountain region, had a strong faith in the possibilities of their scheme; and, as far-sighted pioneers, they saw that the establishment of such a line as they proposed would not only lead to a vast expansion of the illimitable resources of the west, but would bring about that direct connection with the Orient which had so long been the dream of American traders and American statesmen. Something more, however, than strong faith and engineering audacity was wanted to secure the construction of a line of railway the importance of which, in those days, is only to be compared with that of the Suez Canal. This "something" was capital. Local financial resources were exhausted in a few years, and, as in the case of so many other American railways in the early stages of their career, supplies had to be sought from abroad. Happily they were soon forthcoming, through the help of Messrs. Speyer, who, issuing the Central Pacific Six per Cent first Mortgage bonds in the year 1868, at 68

per cent, became the bankers of the line almost at its inception, and have retained that position since. They placed the securities in European markets—notably in London, Amsterdam, and Frankfort-on-the-Main,—and thus ensured the means by which there was built up, in course of time, under the guidance and direction of Mr. C. P. Huntington—late president of the Southern Pacific, and one of the ablest railroad men the United States ever had,—a railroad system that ranks to-day amongst the most important on the American continent.

To revert to the story of the construction of this great system, I may say that the earliest aspirations of an overland route, as cherished by the Government of the day, had not gone beyond the planning of a road suitable for ox-waggons. This primitive means of communication was duly established, and was followed by a coach service, the equipment of which required 100 coaches, 1000 horses, 500 mules, and 700 men, of whom 150 were drivers. There was also started, in April 1860, a “pony express,” one of the riders in which is credited with having on one occasion covered a distance of 340 miles in thirty-one hours. But travellers by this overland route had not only to face blizzards on the deserts, to cut their way through snowdrifts, to cross swollen streams, and to endure the other fatigues and privations inevitable to a journey over deserts and mountains. They had, also, to run the risk of attacks from hostile Indians, and so frequent were these attacks that blood is said to

have "flowed in streams." The route followed was one that left the Missouri to the north of the Santa Fé Trail. It passed through Denver and Salt Lake, and when, later on, some Government surveyors went through that region to plan out a proposed line of railway, they found that the trail which the pioneers of the early days and the gold-seekers of the late forties had followed was the most practicable of all possible routes. Even in 1850 there was a territory west of the Missouri river, south of British Columbia, north of the Rio Grande, and east of the Sierra Nevada, which, over 1400 miles in length and 1300 miles in breadth, was marked on the maps of America as "the great unexplored desert"; while the area between the Missouri river and the Pacific Ocean represented more than one-half of the total area of the United States. Such was the territory that railway enterprise was to open up to the outer world.

A Bill passed by Congress in July 1862 assured a certain degree of support both to the project of the Sacramento Company and to that of the corporation which became the Union Pacific Company, further assistance being rendered by an amended Pacific Railroad Act of 1864. This support was given the more readily by the Government because it was seen that the proposed line of railway would greatly facilitate the movement of troops, would afford better opportunities for national defence in the case of attack by foreign foes, and would have an important political

influence in establishing a closer link between east and west, and checking any tendency towards a separation of the western States from the eastern, the theory being entertained in some quarters that between west and east there was less real affinity of feeling and temperament than there was between north and south.

The Central Pacific line from Sacramento eastward was begun in January 1863, and the work was prosecuted with the greatest energy, many thousands of Chinese being brought across the Pacific to help in the construction, owing to the scarcity of labour. Meantime, the Union Pacific line was being pushed out westward from the Missouri, and the two eventually met, in April 1869, at Promontory Point, near Ogden, thus giving a continuous line of railway from the Missouri to Sacramento of about 1800 miles in length. Extensions to San Francisco and elsewhere, together with various new lines, followed, so that to-day there is hardly a single fertile valley in California without its direct means of railway communication, while the journey from the Missouri to San Francisco, which once took six months to accomplish, amid manifold dangers and hardships, can now be done in three days, with all the comforts and conveniences of express trains and Pullman cars. So the desert lost its terrors, the Indian problem was solved, and mountain passes rising to a height of over 7000 feet are now crossed with absolute safety. Snow may fall thereon to the depth

of eighty-three feet in a single winter, but the trains will run—between Ogden and San Francisco—through thirty-two miles of snow-sheds which are so constructed as to protect the lines, not only from ordinary snow-falls, but also from the avalanches that may come down the mountain sides. To ensure the safety of these snow-sheds, and especially to protect them against fire—for they are liable to destruction either by incendiaries or from sparks from the locomotives—there is a considerable staff of *employés* stationed on the mountain summits, and the sheds are patrolled night and day. There is, too, on the mountains a regular fire brigade, with a locomotive always ready to take hose and men to any point on the line where a conflagration may occur, and new sheds in sections are kept on hand, so that in case of disaster fresh structures may be put up at once with little or no delay to traffic. In some places these snow-sheds are built on special rails, on a telescope principle, and in the summer they are drawn inside larger sheds, thus allowing passengers to have a better view of the scenery. As for the line itself, not only does it rise in the mountains to the height already mentioned, but between Ogden and San Francisco it makes, at present, sixty complete circles. Most of these, however, will be done away with under the improvements in process of being carried out.

The facts given above will afford some idea alike of the particular circumstances in which the great American trans - continental lines were brought into

being and of the engineering triumphs which the lines themselves represent. How dissimilar such lines of railway must be from anything to be found on our own side of the Atlantic is evident enough ; yet one cannot hope to realise the full extent of the dissimilarity until one travels over these western lines, and sees how, for distances as great as that from Land's End to John o' Groats, there are districts so sparsely populated that, as one leading railway official confessed to me, the receipts from the local traffic are often insufficient to cover the pay-rolls of the stations. It is true that appearances are somewhat deceptive. There is, for instance, in the very middle of the Mojave Desert, a place called Daggett, which seems to be about as dreary and desolate a spot as could well be found on the face of the earth. Yet it yields the Santa Fé Railroad four car-loads of borax every day. Then there are branch lines which tap rich mining districts, and points to which live stock, wool, or other commodities will be brought from long distances in the Hinterland. But, speaking generally, the wayside stations for hundreds of miles together on the western sections of the trans - continental lines exist in the interest, almost exclusively, of the through traffic. Even at fairly important stations, such as Las Vegas, where, say, some fifty-five men will be engaged, fifty of them will be required in the special interest of the through business—attending to fruit trains, etc.,—the purely local traffic being such as the remaining five could handle. Out on

the plains one passes scores of "stations" which are named both on time-table and railway map, but which (except for the agent's house) stand by themselves, without any other human habitation in view. One wonders what possible traffic they can provide for; but, in point of fact, they are simply places where railway officials are located to facilitate the working of traffic, this being especially necessary in the case of the single lines of railway universal in the west on which the trains coming in opposite directions pass one another at certain points. The "local" passenger trains are marked on the time-tables to stop there when a flag is shown, but such stoppages in the interest of chance travellers are of rare occurrence. To the occupants of these outposts of civilisation in the arid desert a freight train will take out, in large boiler tanks, a daily supply of fresh water from some point where it can be obtained from river or well, and in the same manner the wayside water tanks from which the locomotives of the passing trains draw their supplies are filled.

When, however, one comes to inquire into the magnitude of the trans-continental traffic, in the interest of which all this construction of railways across plains and mountains, and the elaborate organisation involved in the operation thereof, have been specially undertaken, one gets into facts and figures that show how abundantly the enterprise of the railway pioneers and of those who have followed in their footsteps has been justified by results, and how wonderfully such

enterprise on the part of the railways and such development as has taken place in the resources of the land have acted and reacted on one another. To-day the vast State of California, which stretches 800 miles along the Pacific coast, and extends into the interior for from 140 to 200 miles, is a scene of the most active agricultural, horticultural, and industrial development; but the important consideration from the present point of view is that all this development is mainly due to the fact that the railways have afforded to California the means of supplying the markets, not only of America, but of Europe and of the world in general, with products for which her soil and her climatic conditions are specially adapted. As an additional factor in the situation, one sees still more clearly than before how it is that the railway companies are called upon to handle such prodigious quantities of freight over distances so great.

Of oranges and lemons there were exported from California during 1902 no fewer than 7,000,000 boxes of 70 lbs. each—a falling off as compared with the exceptional crop for 1901, when the total amounted to 9,000,000 boxes. From the Los Angeles district alone some 18,000 car-loads were despatched by rail, each car-load representing from 12 to 15 tons of fruit. Of prunes, California distributed 160,000,000 lbs. (as against 16,000,000 lbs. in 1890); of raisins there were sent out 100,000,000 lbs., and of dried peaches, 60,000,000 lbs. The total exports of dried fruit of all descriptions from

California for the one year amounted to 325,000,000 lbs. In the same period California exported 1,400,000 boxes of apples, each box representing 50 lbs. of fruit, and of these 154,000 were sent across to the Atlantic to be shipped to London, 110,000 boxes went in the same way to Liverpool, 21,000 to Glasgow, 9000 to Hull, and 3000 to Hamburg. Of canned goods (fruit and vegetables) there were sent from California 4500 railway car-loads, representing a minimum of 15 tons each; of Lima beans, 2300 car-loads; nuts, 1300 car-loads; vegetables, 3200 car-loads; wine, 4300 car-loads; sugar, 3700 car-loads; copper, 516 car-loads; wool, 520 car-loads, and so on with many other commodities. Trains consisting of any number of waggons up to forty or even more, and laden entirely with fruit or vegetables, are one of the ordinary features of the freight traffic on the trans-continental lines; and it may happen that as many as 200 waggon-loads of oranges will be despatched by rail from the Los Angeles district in the course of a single day during the orange season, which there lasts from December to July.

These examples may serve to show the magnitude of the freights which furnish so good a harvest for the railways that cross the hundreds of miles of deserts and mountains to reach the fertile districts scattered all along the shores of the Pacific. It is, however, not only the magnitude of the freight that must be considered, but the length of the distances over which such freight is carried. Sixty per cent of the citrus fruits sent

ment has meant a great simplification of the problem of rate adjustment; while to the fruit-growers and others in California it means that the price of their products is kept at the same level practically all over the United States. Here, of course, one gets the consideration that if in America the railway companies charged a strictly mileage rate, people who lived at the end of a 3000-mile journey would have to pay so much more for their fruit than people at the end of a journey of only 1000 miles that the price would be prohibitive to all but the wealthy, and California would be deprived of some of the most important of her markets. The arrangement spoken of affects about nine-tenths of California's total output.

The same apparent inconsistency in the disregard of considerations of distance is found in the charges for the conveyance of Californian products to Europe. Canned salmon brought to San Francisco from Alaska will not only be carried either to Chicago or to New York at the rate of 75 cents per 100 lbs., but the charge will remain the same if the consignment is brought on to Liverpool or London. The rate for dried fruit in boxes or barrels sent from San Francisco to New York is \$1 per 100 lbs.; from San Francisco to London or Liverpool the rate is \$1.10; to Antwerp also it is \$1.10; to Hamburg, Bremen, Amsterdam, or Rotterdam, \$1.15; and to Bordeaux, Norway, or Sweden, \$1.25. Similar figures could be given in regard to other commodities. What happens is that the railway companies, while

quoting a through rate, consider that the freights would have no chance on the foreign markets (in which case there would be no more of such consignments to carry) if full railway rates had to be paid in addition to the ordinary sea rates. They accordingly make the best terms they can with the steamship companies, and cut down the proportion of the rate which they allow for themselves. Unless they did this, much of the traffic in question would probably go all the way from California to its destination by sea.

While, again, the American railway companies aim at putting inland and coast town manufacturers in the same position in regard to freight charges for manufactured goods, these conditions do not necessarily apply in the case of raw materials sent from points where there is no question of sea competition. So one gets the further apparent inconsistency that, whereas the charge for taking wool overland from San Francisco to Boston, a distance of nearly 4000 miles, is at the rate of only \$1 for 100 lbs. (with a minimum car-load), the charge from Las Vegas to Chicago, a distance of 1200 miles, is \$1.65 per 100 lbs. In the one case there is sea competition, and in the other there is not.

The question of the reasonableness of the principles thus enforced by American railway companies—in common with those of the United Kingdom—has been fought out before the Interstate Commerce Commission, which has decided in favour of the companies,—that is to say, where the question of sea competition arises a

railway company may reduce its charges to a point lower than for an intermediate distance, provided the rate in the latter case is itself a reasonable one for the particular service rendered to the individual concerned.¹

So one sees how the railways which followed up the original overland ox-trails with their lines, and afforded thereby the opportunities for that marvellous development of California's natural resources which fills the mind of the European visitor with wonder and astonishment, not only obtain freight to an extent almost without parallel elsewhere in the world, but convey it, in

¹ The ramifications of this sea competition question in America are almost illimitable. In the eastern States manufacturers at points 300 or 400 miles west of New York City will send consignments to New York by rail, and thence to San Francisco by sea, for their customers in the western States. Merchandise has even been consigned in this way from a place as far inland as St. Louis, and the manufacturer has presumably paid less than if he had sent his goods all the way by rail. To get this business into their own hands the railway companies must, therefore, charge no more for the all-rail transit than the total of what the consignee would pay for the part-rail, part-sea service. Again, a manufacturer in the east, consigning to a city (say) 50 or 100 miles east of San Francisco, could send his goods to that port by sea, and have them forwarded thence by rail. To meet this the railway companies will charge him their rate to San Francisco, *plus* the local rate back to the place to which the goods are consigned. The goods put off at the point in question will, therefore, pay a higher freight than those that are carried 50 or 100 miles further on to San Francisco. Under the Act of Congress appointing the Interstate Commerce Commission in 1887, it was enacted in regard to traffic affecting two or more States that railway companies were not to charge less for long distances than for short distances in the case of freight that was carried "under substantially similar circumstances and conditions." But the railway companies were able to show that in such cases as those here referred to the circumstances and conditions were in no degree "substantially similar."

car-loads and train-loads, at rates which are incredibly small for the distance it is taken, but, nevertheless, constitute for them a far more remunerative branch of business than the passenger service. All these developments, however, have avowedly been rendered possible only by the fact that the railway companies keep their operating expenses as low as possible. A certain amount had to be spent on maintenance of way, and no economy could be practised in regard to the passenger service, where it was necessary to maintain the recognised standard by providing every possible luxury; so that the only resource open to the companies was to reduce the operating expenses in regard to the freight trains. This was done in the first instance by increasing the size of the waggons, thus lessening the dead weight carried. The trains were then lengthened and were drawn by two engines; but this meant two sets of wages for separate engine-drivers and firemen, and engines were then constructed so powerful that they would draw practically two trains in one, and necessitate the payment of only a single set of wages. The present tendency is to attach to these engines every waggon they can possibly draw, and I saw on certain main-line sidings some waggons which, originally placed near to the engine, had had their couplings completely torn out, or snapped off, by the enormous strain of the load behind them. Sometimes, I learned, this would happen there to three or four waggons in a day, and the fact suggested that a limit has surely at last been reached

in the growth of the dimensions of American freight waggons and in the weight which a locomotive should be expected to draw. Yet, in spite of the magnitude of the business already done, and in spite of the expansion which the cars have undergone, the demand of the California growers for transportation is in excess of the ability of the railway companies to provide either cars enough or locomotives enough; and one hears of oranges having had to be shipped from San Francisco to Portland by sea, and conveyed thence by rail to the east, simply because the railways further south already had as much business on hand as they could possibly handle.

XIV

GARDENS, DESERTS, AND THE NEW GALVESTON

BY way of giving a concrete example of that advancement in the material prosperity of the American Far West which is having so important an effect alike on the country in general and on the railways that are handling the increased freight, I cannot, I think, do better than select for the purpose of illustration the case of Riverside, Southern California. There is some difficulty in making such selection, as there are so many districts within the State that are well deserving of special mention, and their various claims are advanced with so much zeal in books, pamphlets, leaflets, and reports of all descriptions issued by railway companies, chambers of commerce, boards of trade, or other such bodies, that the inquirer is apt to get overwhelmed by the abundance of information respecting more or less rival districts that is showered upon him as soon as he begins to ask questions. But Riverside is a place that appeals specially to a visitor from Great Britain, inasmuch as

English capital has played an important part in its development, while as a type of the progress of California in general it could not well be surpassed by any other single community in the State.

Before the month of September 1870 the town of Riverside, which to-day houses a population of 10,000 persons, and is the centre of the orange-growing industry of Southern California, was simply a grazing-ground for the cattle that fed on the scanty herbage they found on the hills and dales of what was essentially an arid or semi-arid district. But a little band of enterprising men, seeking a site for a new colony which they proposed to establish in the west, selected Riverside for that purpose, their idea being that under an efficient system of irrigation the soil would be well adapted to the growing of citrus fruits. In some quarters their ideas were scouted as absurd, for much of the land was high tableland, and the proposal to irrigate it seemed to many people altogether impracticable. But the pioneers were nevertheless sanguine that they could change the desert into an expanse of fruit gardens. Accordingly they bought up the land, they planned out a town, they had their first irrigation canals ready by 1871, they planted their orange seedlings, and then they waited to gather in the expected harvest. But the orange seedlings were a failure. So were the lemon seedlings which had also been planted, and, though raisin culture succeeded fairly well, it was soon found that the valley of San Joaquin was much better adapted

for that kind of fruit than the district of Riverside, and thither, accordingly, the industry went. Altogether, the prospects of Riverside grew more and more unfavourable; but the good fortune which the plucky little band of colonists had awaited came to them at last, and it came in a decidedly remarkable fashion. One of the settlers happened to receive from a friend at Washington two orange trees which had been sent to the Agricultural Department there from Bahia, in Brazil. He planted them at Riverside, they flourished, and they produced fruit of exceptional size and quality, but fruit that was seedless. Buds, however, were taken from the trees, and grafted on the stock of the ordinary orange trees grown from seedlings. This grafting was a complete success, and soon there were a number of trees in Riverside producing the seedless oranges. Then everybody there wanted buds for grafting purposes, and the fortunate owner of the parent trees netted a good sum of money by selling the buds at so much each. They were worth all they cost, however, for the oranges they produced became the most popular and the most profitable grown in the United States, and they were the foundation of that remarkable development in orange-growing to which California has since attained. Owing to its peculiar appearance the orange in question became known as the "navel orange," and to-day there are something like 20,000 acres of orange groves in and around Riverside planted mainly with navel orange trees, the whole of those trees having been produced directly or indirectly

from the two referred to above. These parents of so prodigious a family still survive, and are to be seen at the entrance to the famous Magnolia Avenue at Riverside; though so many buds have been taken from them from time to time that the present proportions of the trees are very small indeed. Still, they are deserving of the honour to which they have attained, for the benefits they have brought to the State are almost beyond calculation. From California the fame of the seedless orange has spread, not only throughout the United States, but throughout England and Europe, where the Californian product is becoming a keen rival of the oranges from the Mediterranean and other parts of the world.

The high degree of success to which Riverside attained as an orange-growing centre, when once a profitable type of orange had been discovered, was due in no small degree to the operations of an English company, the Riverside Trust Company, which acquired an extensive holding, planted some 6000 acres of citrus fruits, laid out two magnificent avenues, the Victoria Avenue and the Hawarden Avenue, and otherwise did so much to enhance the prosperity of the place that to-day an English visitor finds himself quite a *persona grata* at Riverside. But in addition to large corporations and large individual owners of orange groves there is at Riverside a considerable number of holders of ten-or twenty-acre plots, representing, in the main, persons who have "retired" with a certain capital, the investment

of which in an orange grove brings a fair return, while giving them a pleasant occupation and enabling them to live comfortably in an ideal climate among the most beautiful surroundings. These conditions form, indeed, a leading factor in the development of California's resources, and inasmuch as one lady whom I met at Riverside spoke of having had, in a single season, 12,000 boxes of fruit, each box representing 70 lbs., from a twenty-acre orchard, the productiveness of the industry is self-evident. When, indeed, 20,000 acres of citrus-fruit groves in a single district are producing fruit on such a scale as this, more or less, one can understand the more readily how it is that the railways get those complete train-loads of oranges and lemons which their locomotives take in such number across the American continent. I may add that a complete system of irrigation has now been carried out at Riverside, the water-rights being included in any land purchase effected, and paid for in the form of a tax which is imposed on the landowners according to the size of their holdings.

Riverside is now producing something like 2,500,000 boxes of citrus fruits per year, and it is claimed that from a certain point in Riverside more acres of land are to be seen under orange cultivation than from any other point in the world. Whether or not this be so, certain it is that a more beautiful sight than is presented there by the apparently endless vistas of orange groves, with their abundance of golden fruit, the innumerable "fan" palms (*Washingtonia robusta*) and magnolias

that line the streets, and the profusion of rose trees, geraniums, and other flowering plants in full blossom even in January, could hardly be desired. Riverside, though little more than three decades old, has, indeed, developed into a thriving business and residential town, full of picturesque dwellings—(for whether such dwellings be pretentious villas or labourers' cottages, the wealth of verdure around them makes each one a picture in itself)—and essentially a place that may be commended to the notice of visitors to California who desire to see a fair sample alike of the beauties of that State and of the practical results to which the enterprise therein has led.

The agreeable impression which Riverside and the country round about it make upon the mind of the visitor is all the stronger in the case of a traveller proceeding east, because very soon after leaving Colton (the junction for Riverside) one comes upon a desert territory which stretches in the direction of New Orleans as far as Del Rio, Texas, a distance of 1200 miles, with only one oasis of any important dimensions—the city of El Paso—between those two points. It is said that under the influence of irrigation much of this desert would “blossom like the rose.” But the water is not there yet, and what one looks upon for hundreds of miles at a time is vast expanses of sandy plains, prolific in cactuses, but, so far as the eye can reach, practically uninhabited by man, except at points where the necessities of the railway traffic require a

modest station, or the residence at that spot of a small body of railway workers, mostly Mexicans. At one place the traveller sees a veritable mirage, such as those found in the desert of Sahara; at another the track is no less than 280 feet below the sea-level; and at others the horizon is obscured by sand storms, or the word "Sand" will be seen on a board alongside the line to warn the engine-driver that just ahead of him he may possibly find that the wind has blown a sand-hill right across the rails. True it is that there are places in this inhospitable region where copper and other minerals provide a fair amount of freight, and El Paso, Texas, situated at one of the gates of Mexico, and itself the centre of a good mineral and agricultural district, helps to load a good many railway waggons;¹

¹ El Paso is a city with a past,—and a future. Here it was that in 1598 the Spaniards crossed the Rio Grande river, and took possession of "New Mexico and all the adjoining provinces" in the name of the Spanish king. This was twenty years before the arrival in America of the Pilgrim Fathers. A settlement was established, and it was known as "Don Ponce's Ranch" down to the time of the Mexican War, when the name was changed. In the last two decades El Paso has made great progress, and to-day it has the appearance of one of the most active and most promising of American cities, even although the visitor from east, west, or north must cross five or six hundred miles of barren sandy waste before he gets there. In El Paso County, which covers 9750 square miles, gold, silver, lead, copper, and coal are all found in more or less abundance; there are great pine forests and extensive tracks of grazing land; while smelting plants which are claimed to be among the largest in the world have been set up three miles west of the city. Agriculture has prospered in this western oasis because there runs through El Paso a river which could once be compared with the Nile in the quantity of rich, fertilising matter it brought down, the mud thus formed containing all the plant food necessary to replace what a crop takes from

but, with these exceptions, there would not be sufficient local traffic picked up between Colton and Del Rio to justify a line of railway at all, and the only *raison d'être* for the Southern Pacific line between those two points is the through business. At Del Rio one gets into a fertile district again, and between that place and Houston, 379 miles further east, some good local traffic is obtained ; but the real objective of most of the freight carried from California by the Southern Pacific Company over the dreary deserts, where water is a luxury that has to be conveyed by train a distance of, it may be, from 200 to 300 miles, is Galveston.

Here one enters upon another phase of that trans-continental traffic with which I have already dealt,

the soil. I was told of fields in the Rio Grande valley which, thanks to the muddy waters of the river, had produced their crops of alfalfa for half a century without once being ploughed. But of late years these said waters have been inconstant. The schemes being carried out in Colorado for storing up the rivers formed from the melting of the snows in the Rocky Mountains, and using them for irrigation purposes, are excellent—for Colorado ; but they so far reduce the volume of water available lower down those rivers that in the case of El Paso and the Rio Grande it is only in time of flood that the farmers get a really plentiful supply. So the question arises : To whom do the snows that fall in the Rocky Mountains really belong ? I resist the temptation to discuss this interesting problem, so that I may proceed at once to the most singular fact of all. El Paso has an alternative water-supply, for underneath the Rio Grande there is, at a depth of sixty feet or more, another river which, in a report presented to the El Paso Chamber of Commerce in December 1902 by Professor E. M. Skeats, is said to be "some four miles broad." To utilise this subterranean stream by means of pumps is regarded as quite feasible ; though the water in the underground river contains nothing like the same degree of fertilising matter as the river that flows—or ought to flow—on the surface.

and it is one of very considerable importance from the railway standpoint. Whereas other American lines of railway handling freight which goes from the Atlantic to the Pacific, or *vice versa*, can take it only a certain distance themselves, having then to transfer it to the lines of some other company, the Southern Pacific is in the fortunate position of being able to keep the freight to itself for the entire journey. This it does by supplementing its branch of railway from San Francisco to Galveston—a distance of 2130 miles—by a line of steamers between that port and New York, the freight being transferred at Galveston from railway car to steamer, or from steamer to railway car. In this way not only is a substantial advantage gained by the Southern Pacific, but the eastern lines of railway are relieved of a large amount of traffic which, in their already congested condition, they would hardly be able to deal with ; while the traders do not suffer, for, by taking freight half the distance by sea, the company in question gains some five days in the delivery of consignments between Atlantic and Pacific points, as compared with the all-rail routes.

At one time the Southern Pacific Company favoured the port of New Orleans, but there was a saving of 350 miles of railway by their going to Galveston instead—and the lines between Houston (the junction for Galveston) and New Orleans are especially crowded with traffic,—while the sea distance between Galveston and New Orleans is only 180 miles, which scarcely

counts at all in the voyage of a steamer. So the Southern Pacific began the construction at Galveston of docks, warehouses, grain elevators, etc., on a scale of exceptional importance, and good progress had already been made with the work when, in September 1900, Galveston was visited by the most terrible of disasters.

For four days a hurricane had been steadily piling up the waters in the Gulf of Mexico, and these at last swept over Galveston to the depth of from five to ten feet, accompanied by a wind which at one time blew at a speed of 130 miles an hour, reducing a great part of the city to ruins and causing the loss of some 10,000 lives. The works already commenced for the Southern Pacific Company naturally suffered with the rest, one English ship being carried right through the dock foundations and breaking them down without any one on board even being aware of the fact. The fate of Galveston seemed at first to be sealed; but no sooner had the work of discovering and disposing of the remains of the victims been completed than the engineer in charge of the new Southern Pacific docks, Mr. G. W. Boschke, without waiting to obtain the sanction of his superior officers, gave orders that the programme undertaken should be resumed at once and carried out all the same. This decision—which was duly approved by the company—was the salvation of Galveston. From a material standpoint it meant the immediate circulation of from \$40,000 to \$60,000 a week in wages, and this was a boon which the im-

poverished survivors greatly appreciated ; but it had a still greater moral effect, for the news that the Southern Pacific had resolved to stand by Galveston put confidence into the hearts of trading companies and of the citizens in general, and encouraged them to make every effort to revive the fortunes of a city which had sustained a calamity that might well have crushed the stoutest of hearts. To-day along the bay front there is being constructed by the county of Galveston, at a cost of \$1,500,000, a sea-wall 17,600 feet long and rising to a height of 16 feet above the sea-level, the effect of which should be to protect the city from any repetition of the disaster of 1900. By special request of the authorities concerned, the construction of this sea wall—which is to be formed of concrete on a piling foundation, with rip-rap protection—has been taken charge of by the Southern Pacific Railroad Company's superintendent of construction, the aforesaid Mr. Boschke. Then, too, the entire city of Galveston is to be raised a height of ten feet, the State of Texas having agreed that for a period of seventeen years the city shall appropriate to the cost of this work—estimated at \$3,000,000—the money which it would otherwise pay to the State in the form of taxation.

As for what the Southern Pacific Railroad Company has done at Galveston in order to obtain greater transport facilities there for itself, the sum that has already been expended amounts to \$3,000,000, and there is much more to follow. The company began

by reclaiming from Galveston Bay 205 acres of land, doing this by enclosing certain spaces by bulkheads and then pumping mud and water into them from the bottom of the bay until the mud had filled them up, such mud, when dry, forming the land on which the various buildings have been constructed. These take the form, on pier A, mainly of a grain elevator, capable both of holding 1,000,000 bushels of grain and of loading three vessels at once, and of a power-house for the supply of electricity for power, lighting, and also for heating purposes. Owing to the nature of the soil, the elevator has been constructed on 2500 piles, each 50 feet long, these piles being surmounted by 8 feet of concrete; and the power-house stands on 800 piles, of the same length, on which there is 12 feet of concrete. The dock alongside is 1500 feet long and 250 feet wide, with a depth of 30 feet of water, and this depth is practically constant, there being a difference of only a single foot between high and low tide. Six vessels can be loaded in the dock at the same time, three on each side. Pier B, on the other side of the dock, is 1500 feet long and 650 feet wide, and accommodation is provided there for sixteen separate railway tracks in such a way that the loading or unloading of this number of freight trains can all go on at the same time. I had the opportunity of seeing a steamer unloaded from the end of the pier, and could not but admire the dexterity with which the work was done. Between the vessel and the floor of the shed in which the freight cars were

waiting, end on to the vessel, in gridiron fashion, there was a series of conveyors, or moving platforms, operated by electricity, seven being provided for each vessel. As soon as the freight was raised from the hold it was put on a truck, and this was wheeled a few feet until it reached the moving platform, which at once conveyed it up the incline to the floor of the shed, without any effort on the part of the man in charge. The moment the truck reached the top of the conveyor (which has a length of 36 feet, works on the endless chain principle, and can carry eight tons of freight at one time) it was wheeled off, the goods being taken at once to the particular train or car in which they were to be loaded, according to destination. Truck succeeded truck up these moving platforms with the regularity almost of clockwork, and such was the despatch with which the whole business was conducted, and so close the contiguity of trains and steamer, that I saw no reason to doubt the statement that 3500 tons of cargo will be discharged in the course of a single day, and all sent off by train before nightfall. The company's docks and sheds give employment to 900 men. Ample space is left for considerable enlargements at some future date, the construction of four or five more piers being contemplated by the company, and, with the other improvements that are going on there, Galveston, the apparently ruined city of a few years ago, is looking forward to attaining a high rank among the shipping ports of the world.

The Galveston docks afforded me, also, some further

enlightenment concerning the magnitude of that long-distance freight traffic which forms the main justification for the building of lines of railway of such great extent across the otherwise trackless desert. I have spoken of the large consignments passing from the west to the east, and in this connection I might add that hardly one of the vessels of the Southern Pacific fleet leaves Galveston for New York without taking on board 40 or 50 car-loads of sugar that has come from the Sandwich Islands *via* San Francisco, and large quantities of other foreign products besides. But, taking the freight that goes from the Atlantic to the Pacific by the combined sea and land route, I learned that for San Francisco alone, or for countries to be reached *via* San Francisco, there is sufficient cargo received by each of the Southern Pacific steamers arriving at Galveston from New York to fill from 70 to 150 cars, without counting that destined to other places. So it is that there are made up at Galveston "steamer specials," as they are called, which run right through to San Francisco without any stoppage other than that necessitated by change of locomotive or staff, or the taking in of fresh supplies of water, the freight put in at Galveston not being touched again until the journey of over 2000 miles has been accomplished.

When not only car-loads but complete train-loads of freight can thus be made up for long-distance points, it is evident that the moderate dimensions, even if not the absence, of local traffic over intervening territory is a

matter of less importance than it would otherwise be, and becomes a secondary consideration to companies which already find their energies taxed to the utmost to carry all the through freight that is offered to them. But the facts I have given will further serve to illustrate the necessity that the American railway companies feel themselves under both to increase their terminal facilities so as to meet or provide for every possible demand, either at the present moment or at some future time, and also to keep their main lines, even through desert regions, in the highest state of efficiency. All this has been the policy of the Southern Pacific Company for years past. The company, indeed, has not yet begun to pay dividends, preferring to devote practically the whole of its surplus earnings to the betterment of its lines, and wait for dividends until the entire system has, more or less, been put into first-class condition. As that system represents a mileage of 9000, and as much of it was originally built on the usual principle of early American railway construction—that of providing only for immediate requirements, and leaving betterment for a later date—the outlay involved by the essential improvements is necessarily heavy. To meet the requirements of its present traffic the Southern Pacific has, for instance, adopted an 80 lb. rail as a standard, and in many places this rail is replacing rails of from 50 lbs. to 62½ lbs. During 1902 \$1,500,000 was spent on rail renewals alone. In the same way the ballasting needs to be kept at a high standard, and in

the long journey across Texas I noticed from the observation car of the train the solid road-bed of rock ballasting with which the line was provided in even the most desolate of regions. On such ballasting the Southern Pacific spent \$783,000 in 1902. Other items in respect to repairs and renewals brought up the total expenditure for the year on that account to \$12,000,000, the whole of which was charged to operating expenses. The total income of the company for the year amounted to no less a sum than \$87,000,000, and the disbursements (including the operating expenses aforesaid) to \$76,600,000. Of the balance a sum of \$7,000,000 was devoted to new constructions and improvements—(among the items under this head being \$2,800,000 for reconstruction, changes of line, and revisions of grade and alignment, and \$1,000,000 for sidings to meet the increased traffic). Adding this \$7,000,000 to the \$12,000,000 referred to above, one gets a total of \$19,000,000 spent by this one company in the course of a single year on repairs, renewals, and improvements, all tending to the "betterment" of its lines. To this total may be added another half-million dollars for new equipment in the shape of fresh cars and locomotives.

The reasonableness or otherwise of the policy thus pursued in practically devoting the whole of the earnings to betterment is a point I need not stay to discuss; but the figures given fully confirm what I have previously said as to the magnitude of the expenditure to which American railways must go in order to bring their

originally more or less primitive and imperfect lines up to the standard of efficiency needed by present-day demands. On the other hand, the policy now being followed by such a company as the Southern Pacific, not only in making its lines equal to these present-day demands, but in seeking also to provide for the future, must have the effect of adding greatly to the value of the system, and of ensuring a very substantial return at some future time.

XV

PROGRESS IN THE SOUTH

IN the southern States one hears the same story as one meets with elsewhere in America, of congested railway lines and of the difficulties that have been experienced by the railway companies in handling business that has grown at a greater rate than their own powers of transportation, especially in the matter of cars and motive power. Merchants and manufacturers have complained bitterly of the way they have been handicapped by reason of the delays in getting their commodities despatched by rail ; while southern companies say that the eastern lines have so much freight of their own that at times they simply cannot accept traffic from elsewhere, so that loaded cars intended for the east get no further than the gateways south of the Ohio, where almost every junction has its collection of freight awaiting a clearance of the lines before it can get through. The glut of business in the south is mainly the outcome of the remarkable expansion of the resources and manufactures of that section of the United States

during the last two decades, and especially during the past three or four years. This expansion, in turn, constitutes an important fact in the progress of the American continent; and it means, also, a closer knitting together of southern and northern interests, through the connecting link of the railways, than has been the case at any time since the close of the Civil War.

The end of that war left the southerners absolutely prostrate. They had suffered a stupendous financial loss, not only in the cost of so prolonged a struggle, but in being deprived of the slaves who, directly or indirectly, represented the main source of their wealth. As landowners they lost the help on which they had relied for the cultivation of the soil, and, not possessing the agricultural knowledge and experience of northern farmers, they were ill-adapted to undertake the work themselves. They had neither capital left nor credit on which they could draw; and the political situation in which they found themselves—being deprived of rights which were now conferred on their former slaves—was a finishing stroke in the way of disheartening them. So the position remained until the early eighties, when improved conditions set in. One of the earliest of these was the fact that the valuable forests of pine, cypress, oak, and other timber in the southern States attracted the attention of lumbermen in the north, who were looking out for fresh supplies in the place of those which the wasteful and wholly im-

provident methods adopted in States like Michigan and Wisconsin were rapidly exhausting. This led to the setting up of a large number of saw-mills in different parts of the southern States, and where the saw-mills were built the railways soon followed.

Here, then, was a beginning of that investment of northern capital in southern enterprises which has since been followed up with so much persistence. Soon afterwards it was found that there were vast possibilities in the mineral wealth of the south; and the fact that ore, fuel, and flux were there in close proximity led to the organisation of iron and steel works, which, productive as they have been already, are regarded as being at present merely in their infancy. Then, again, as the outcome in part of the Cotton Exposition held in Atlanta, Ga., in 1881, enterprising northerners saw there was a scope for profitable investment in factories for cotton goods in the southern districts where the cotton was produced, instead of merely growing the raw material there and then taking it to New England or elsewhere to be made up. This idea in itself led to the starting in the south of a new industrial movement which has undergone great expansion. It was followed by a purely southern enterprise in the utilisation of the by-products of cotton, formerly thrown away as waste, but now converted into cotton-seed oil, meal, and cake with such success that, as an expert at Memphis, Tenn., assured me, it would even pay to grow cotton for the sake of the cotton-seed products

alone. Still another great industry in the south, the growth mainly of the last fifteen years, is the cultivation of rice; and in Western Louisiana, especially, one sees a vast expanse of rice fields on what were once unproductive prairies. Here, again, the new energy of the south has been aided by capital from the north. When the enterprise was started in Louisiana the rice-growers relied on the elements for their supply of water. But one or two dry seasons occurred, and short crops were the result. Northerners with money to invest looked into the business, saw the prospect of substantial profits if an efficient system of irrigation were adopted, and then advanced the needful funds, with the best of results both for themselves and for the southerners, who are now far less dependent on the north than they were before. To-day the chief difficulty in regard to rice cultivation in the south seems to be the finding of markets enough for the abundant crops.

No less striking has been the growth of the oil industry in the south. The discovery of oil at Beaumont has been followed by similar discoveries at Jennings, Welsh, Anse la Butte, and other places. Prosperous towns have sprung up there, and wells and refineries have been established which give employment to thousands of men, are adding greatly to the wealth of the district, and are supplying a product which is rapidly taking the place of other kinds of fuel. The extensive use that is made of oil both in the southern States and in the west comes as a revelation to the traveller. Not

only do the locomotives burn it, and not only are the road-beds of the railways sprinkled with it, to lay the dust, but oil is becoming there the chief motive power for machinery of all kinds; and from what I saw of its use in the case of some large boilers just put in at the Galveston Docks I should say that its application to such purposes has been most successful, and might be specially commended to the consideration of those who seek to mitigate the evils of the smoke nuisance in large industrial towns. Sugar-growing is another industry that is making great progress in the south, there being some sugar refineries which employ as many as 1000 hands each; and there are salt mines in Louisiana which furnish the railways with from five to ten car-loads of salt at a time.

Finally, mention must be made of what is taking place in the Memphis district in the way of attracting new industries to the south. I have spoken of the fact of lumbermen in the north being attracted by the forests in the southern States; but it still remained the practice of those who resorted to the forests to send the timber north, there to be made up into the various manufactured articles for which it was wanted. It occurred to some of the leading citizens of Memphis that it would be a good thing if, in addition to having the saw-mills (of which there are already 500 within a radius of 100 miles of the city), they could get the manufacturers of articles in wood to remove their factories to Memphis, so as to be near to the localities

whence they now got their raw material. There was accordingly formed a Memphis Industrial League, of which people of every class of the local community interested in the welfare of the city become members. In Mr. I. F. Peters the league found a most energetic industrial commissioner, and in the course of 1902 it induced no fewer than twenty-seven manufacturing concerns to remove from Illinois, Michigan, Wisconsin, and other States in the north to the neighbourhood of Memphis. Some of the factories thus set up there are of considerable magnitude. Among the new-comers are makers of builders' supplies, of staves for oil and whisky barrels, wheel-barrows and hand-carts, elevators, wooden pumps, and many other things in regard to which the proximity of the hundreds of thousands of acres of suitable timber in Tennessee is an important consideration, Memphis claiming to be now the centre of the greatest hardwood district in North America. Then, too, according to official statistics, the area occupied by pine forests (without reckoning other kinds of timber) in nine southern States is 150,000 square miles, and the amount of yellow pine available is estimated at 300 billions of feet. When the land in these southern States has been cleared of timber there will be left a rich alluvial soil hardly to be surpassed in the United States for cotton-growing or agricultural purposes.

This brief outline of what is being done in the south may help the reader to realise the industrial

and commercial changes which are creating "a new south" as compared with the conditions that existed before the Civil War and in the years immediately succeeding. But there have been important changes in the southerners themselves, as well as in their surroundings and material circumstances. The southerner before the war was a man of culture, refinement, and travel, who had learned to depend on his slaves for the means of obtaining the luxuries as well as the necessities of life. The generation succeeding him found that luxuries were to be looked for no more, that they must learn to rely on themselves, and that even necessities could only be got by hard personal toil. So they prepared for the battle of life by an education that was commercial rather than literary; and they entered on their business undertakings with a thoroughness that knew of no false pride, or they embarked on professional careers with an energy that led many of them to achieve great success. The ground was thus well prepared for the development, with the help of northern capital, of those varied industries and enterprises which are now so rapidly changing the whole aspect of the south.

Coupled with all this there has been a steady influx of population into the southern States. The flow of northern capital has been followed by a flow of northern farmers, and by the overflow of immigration in general, the cheaper lands of the south—where the owners of large plantations are dividing them into farms ranging

in area up to 200 acres—being a recommendation to those who find the settled and cultivable lands of Illinois, South Dakota, or Nebraska beyond the reach of their purse. Much has been done by the railway companies to encourage this immigration, the Southern Pacific Railroad Company having had an especially active organisation working on these lines. As showing the general effect of all this activity, it may be mentioned that in Calcasieu, the largest parish in the State of Louisiana, the assessed valuation of property in 1880 was \$700,000, and that within ten years it had risen to \$9,000,000. In the city of Memphis the population in 1890 was 64,000, whereas in 1902 it was estimated at 150,000. Crowley, La., was prairie land only a few years ago. The Southern Pacific Company was induced to set up a railway station there, and around that station there is now a population of 7000.

When, therefore, one speaks of progress in the south, there are substantial facts and figures to go upon; and the nature of such progress, as here set forth, must be realised if one desires to understand the position of those lines of railway which are called upon to convey all the freight that is the final outcome of so great an outpouring of energy and enterprise.

There are other circumstances, besides, which combine to make the position of the said lines of railway—and especially those operating between the south and the north—one of no little interest from the point of

view of American railways in general. In connection with the trans-continental traffic I spoke of sea competition as the determining factor in the matter of rates. Along the Mississippi valley the determining factor is the river competition. Down to 1870 the Mississippi and its tributary rivers carried the greater part of the passengers and freight to or from the States through which they passed; and what this meant will be better understood if I add that the number of States which may be fairly regarded as tributary to the Mississippi is no fewer than twenty-four. That railways could successfully compete with the lines of large and well-equipped steamboats then performing regular services between the various river points was at first regarded as impracticable, and there was a disposition shown alike by authorities and by the representatives of vested interests to encourage the steamboats and handicap the railways. But the latter were constructed all the same, and they at once met the competition of the steamboats by accepting the same rates for the conveyance of freight. They were naturally able to ensure delivery in much quicker time, while by means of branch lines they got lumber and other freight which had previously to be conveyed to the river some distance by road.

So the decline of the river traffic set in, and, though that traffic is still considerable for certain commodities, and in respect to purely local business, the railways have captured most of the trade that was formerly

carried by the steamers. Yet the possibility that the traders will return to the freight steamers if the railways are too heavy in their charges restrains the railway companies from asking for too much. Thus the rates by steamer from St. Louis or Memphis to New Orleans will fix the rates for freight carried by railway between the same points. But this is not all, for there are other places, not on the river, which would suffer in competing with the manufacturers or merchants of St. Louis or Memphis if they had to pay more than their competitors for transit to New Orleans. The railway companies therefore consider the interests of these traders as well; and so it goes on, step by step, with other towns or districts beyond, until a vast extent of country is more or less influenced by the river rates. In fact, Mr. M. C. Markham, late assistant traffic manager of the Illinois Central Railroad Company, said in some evidence he gave before the United States Industrial Commission in April 1901: "The complexities and necessities which confront railroads in rate-making are such as to make this river influence almost conterminous with the Rocky Mountains on the one side and the Atlantic on the other." In the case of freight moving, say, between New York and Memphis, it is easy to see that, if the railways charged rates that were too high, the trader might send his consignments by sea between New York and New Orleans, and by river steamer between New Orleans and Memphis. River competition, therefore, may be



quite as important a factor in the fixing of rates as sea competition; and, coupled with the large amount of freight carried in individual consignments, and the keen competition between the railways themselves, it may help still further to explain how it is that American railway rates are, generally speaking, kept at so low a level.

The question of the magnitude of the consignments affects, indeed, the southern traffic just as much as it does the eastern and western, with which I have already dealt. In the case of lumber alone, the quantity sent out from the Memphis district during 1902 required the use of 35,000 railway waggons. One of the oddities there of the newly-imported businesses in wood manufactures is that a maker of butchers' skewers at Memphis will send those articles by the car-load, *via* New Orleans, even to such a country as Egypt. Of rice the movement by rail in or from the southern States is between 350,000,000 lbs. and 400,000,000 lbs. a year. Of cotton goods the total output of the southern States amounted in value in 1902 to \$94,000,000; flour and grits, \$89,000,000; tobacco, \$62,000,000; cotton seed, oil, and meal, \$42,000,000; iron and steel, \$38,000,000; cars, engines, etc., \$37,000,000; foundry output, \$30,000,000; sugar from refineries, \$23,000,000; chemicals, \$22,000,000; fertilisers, \$18,000,000; furniture, \$4,000,000; and cooperage, \$3,000,000.

Of the imports received *via* the port of New

Orleans the most noticeable feature is the enormous trade in bananas. The company which is mainly concerned in this business will import, during the course of twelve months, 6,000,000 bunches of bananas. Each ship-load arriving at New Orleans represents, on an average, sufficient fruit to load forty railway waggons ; and there will generally be one such steamer each day practically all the year round, 95 per cent of the whole of the bananas received at the port being sent away by rail. Such is the expedition shown in handling the fruit that an entire ship-load of bananas will be removed from the vessel, packed into the waggons of the Illinois Central Railroad Company, and started to its destination within four or five hours. If no purchasers have been found for a particular cargo, or any portion thereof, it is despatched all the same to Mounds, a station 567 miles on the way to Chicago, and instructions will be sent there later in the day by telegraph, to say what shall be done with it on arrival. In this way complete train-loads of nothing but bananas are despatched daily from New Orleans, the fruit being distributed from one point or another along the Mississippi valley to every part of the United States. The banana trains go north to Chicago, or to such other points as they may be destined for, on what is almost passenger train time, and they take precedence of all other freight traffic ; though the Illinois Central Railroad has not yet been reduced to the position of a certain railway in the

south which announced to its patrons during the course of 1902 that, owing to the large amount of freight business to be done, it might be necessary sometimes to put a passenger train into a siding, so as to allow a goods train to pass!

Another interesting feature of the traffic between south and north is in regard to garden produce. The direct line of the Illinois Central Railroad Company from Chicago to New Orleans is 912 miles long; and such is the diversity of climates covered by this one line of railway that during my visit to New Orleans early in February the fruiterers there were displaying for sale strawberries grown in the open air in Louisiana, while at the other end of the line the city of Chicago was struggling with a blockade of ice and snow. The outcome of these conditions is that in the opening months of the year the Illinois Central takes large quantities of early vegetables from Louisiana to Chicago. In a single day as many as twelve car-loads of cucumbers have been sent to Chicago from New Orleans, a car-load representing between 24,000 lbs. and 30,000 lbs.; and from ten to fifteen cars of tomatoes will go each day in the local season from Crystal Springs, a record consignment being thirty-three car-loads to Chicago from this one point alone. Potatoes are taken in car-load lots at the rate of from ten to twenty cars a day, and cabbages and lettuces also go in large quantities. This branch of traffic begins from New Orleans in January. By the time the Louisiana fruit and vege-

table season is over that of Tennessee and Missouri will have begun ; and so the railway will carry fresh fruits and vegetables from the southern States to the north until the season there has fairly commenced, the north-bound traffic being especially heavy in April and May. Then about July 1 the business starts afresh in the opposite direction. Vegetables grown in the south will not keep long owing to the excessive moisture of the soil, and by the time that the northern supplies are ready those of the south are exhausted. The more hardy growths from the north will then be especially welcome as a means of supplying southern wants until January comes round again. To the Illinois Central (the chief line concerned), with its 5000 miles of railroad, including widespread ramifications in the north, this garden-produce traffic naturally means a good all-the-year-round business, in addition to the considerable amount of other freight it handles, so that the company has found it necessary to arrange for a double track between New Orleans and Chicago, the possession of which will give it an almost unique position among the western and southern railways. In other directions, also, there is to be a substantial increase of railway facilities between north and south. The St. Louis River Valley Railway, now in course of construction for a distance of 125 miles south of St. Louis, along the eastern bank of the Mississippi, will eventually become part of the Missouri Pacific-Iron Mountain system, avoiding the heavy grades now found in the

Ozark Mountains, and allowing from fifty to cars to be taken in one train. On the western the river the San Francisco system is acquiring building new lines, and in still other direct territories are being opened up.

The position of St. Louis in regard to developments is one of exceptional importance. ally the great distributing point for traffic east and west, St. Louis has in later days had the palm in that respect to Chicago; but it is still the central market of the Mississippi valley. A vast amount of both passenger and freight is dealt with there between east and west and south and north. One million bales of cotton, for instance, are received at or passed through St. Louis in the course of a year; so will 100,000 railroad cars of yellow pine and 25,000 of hardwood lumber, 6000 or 7000 loads of apples from Arkansas and Missouri, a car-loads of water-melons, also from Arkansas. In January 1903, 3,500,000 bushels of maize were shipped out from St. Louis, and in February of the same year one grain elevator alone had the equivalent of 1000 loads of grain awaiting transportation, but could not get rid of it for want of cars. When one looks at the figures showing the sum total of business done at St. Louis the following results are obtained:—

	1902.	1901.	1900.
Freight received at St. Louis by railroad or river for three years—			
Total in tons	18,477,729	17,896,328	15,887,451
,, by rail	18,060,809	17,433,523	15,375,441
,, by river	416,920	462,805	512,010
Freight shipped from St. Louis—			
Total in tons	11,259,848	10,862,336	9,425,889
,, by rail	11,035,586	10,653,065	9,180,309
,, by river	224,262	209,271	245,580

The above table is of the greater significance—as showing the movement of freight traffic in the United States—when one remembers that, though the largest, St. Louis is only one of half a dozen or more of central “gateways.” Such, however, has been the congestion experienced that two of the railways operating in the south gave notice to the St. Louis merchants early in 1903 that they could not accept any consignments from them for one week, as they wanted to clear off the accumulations they already had on hand!

In various ways, too, the arrangements made at St. Louis for dealing efficiently, expeditiously, and economically alike with passenger and freight traffic are well deserving of mention. St. Louis has, for example, a “Union” railway station into which there run the trains of no fewer than twenty-one different railway companies. It is the property of the St. Louis Terminal Railway Association, a body which originally consisted of six railway companies, but now has fourteen on its list of proprietors. The station itself

is used exclusively for passenger traffic. It has thirty-two different tracks, and the approaches are so arranged that every train backs into the station, the locomotive being thus in the proper position to draw the train out again whenever desired, without any need for reversing it. The charges imposed on the companies using the station—whether proprietors or not—are fixed on a wheelage basis, according to the amount of operating expenses, etc. The present rates work out at \$1.65 per car, nothing being paid in respect to the locomotive. No profit is sought to be made by the association on the passenger trains using the dépôt; but the association does aim at making a profit on the freight business which it also conducts, the special function it discharges in this respect being in operating the transit of trains from one side of the Mississippi to the other, over either the Eads' Bridge or the Merchants' Bridge (both of which it owns, in addition to the tunnel), and in doing the work of transferring cars from the lines of one company to those of another. Altogether, the association will deal with 700,000 freight cars in the course of a year, and its freight earnings amount to \$3,700,000 per annum.

Another feature of the railway position at St. Louis is represented by what is known as "Cupple's Station," a place that is certainly unique on the American continent, if not in the world. It is the outcome of the enterprise of a private company which, in the first instance, arranged to have railway waggons run into

the basement of its premises (such basement being on a level with the railway, while the front of the building was on the street level), so that goods consigned to the firm could be taken from the cars direct to the warehouse, those to be sent away being loaded in the same manner. The experiment answered so well that more premises were constructed alongside, on the same plan, and other merchants were invited to rent them. To-day Cupple's Station represents a group of fifteen buildings, extending over an area of 300 feet in one direction and 900 feet in another, and occupied by fourteen different firms (some of them among the largest in their particular line of business in the United States), and a number of individual brokers. The company now has nine different railway tracks coming into or alongside the buildings in question, such tracks being capable of accommodating fifty-six railway cars at one time. The cars loaded with consignments for the different tenants of the premises are brought into the station during the night, and unloaded between seven o'clock and ten in the morning. The freight taken from them is put on four-wheeled trucks, of which the company have 4000 (a supply sometimes unequal to requirements), and the trucks are raised by one or other of a series of ten hydraulic elevators to a commodious distributing floor, where each tenant has an office. The freight will be taken thence by other lifts, or across bridges connecting the different buildings, to the warehouse of the consignee. Soon after mid-day the tenants will begin to

send to the collecting floor the goods they want to be despatched, and these are lowered by the elevators to the cars awaiting them in the basement, the last car being generally sent off by about six o'clock. The general merchandise thus dealt with by the company for its various tenants amounts to about 30,000,000 lbs. a month, and the entire cost of handling both incoming and outgoing freight, from the time it is received into the station from the railway companies until it is delivered to the merchant, or from the time it leaves the merchant's warehouse in the upper storeys until it is loaded into the cars in the basement, works out at about fifteen cents per ton.

XVI

THE NORTH-WEST AND ITS STORY

MUCH is heard from time to time, in a general sort of way, of the "great progress" which is being made in the north-west of the United States ; but the phrase is ill-defined, and it is not until one learns some such fact as that during the course of 1902 ten railway companies took out, between them, from Minneapolis (Minnesota), 100,456 car-loads of flour and mill-feed that one can begin to form an adequate idea of what such progress may mean. In further departments of north-western commerce and industry one hears of a single line of railway in the north-west which handled 70,000,000 bushels of wheat during 1902, 40,000,000 bushels of other grain, 4,000,000 tons of iron ore, 4000 cars of cattle, and vast quantities of timber, copper-ore, tinned salmon, and other things besides. All this is suggestive enough of the volume of freight which the railways in the north-west have to handle, and it is significant that, according to some authorities, it was in the north-west that the idea of reducing operating

expenses by adopting larger freight cars and more powerful engines first underwent its most pronounced development.

The story of this progress in the north-west has an interest all its own because the personal equation plays so prominent a part in it. Elsewhere in the United States progress has been the outcome mainly of the general advance of commerce or of society. The railways followed the ox-trail as the inevitable result of new conditions in which a multitude of persons, more or less, were concerned; but in the north-west the railways opened up new ground where there was not even a pre-existent ox-trail, and where no pioneer of commerce had yet marked out the route along which the locomotive should follow. In the north-west, indeed, it is especially true that the railways built out into the uninhabited prairie or the trackless forest, leaving population to follow, and then assumed the rôle of immigration agents, sending out far and wide into the highways and byways both of America and of Europe to bid people to come in and settle on the lands that had thus been opened up to them.

The figure which stands out most prominently in the story is that of Mr. James J. Hill. To-day Mr. Hill is president of the Great Northern Railway Company, with which are combined the Northern Pacific and the Chicago, Burlington, and Quincy Railway systems; and he is, besides, the man who is the most strongly-marked personality, and one of the greatest, if not the

greatest, of individual forces, in the American railway world.¹ But Mr. Hill would hardly have attained to this position had he not joined to an unbounded belief in himself an equally unbounded belief in the possibilities of the north-west. Essentially a strong man, ever confident in his own judgment, and disposed at all times to take the organisation and the control of everything connected with his lines on his own shoulders, as far as possible, his masterful spirit has nevertheless been the obedient slave of the fixed idea of his life,—that there were great possibilities in the north-west, and that his whole strength and energy should be devoted to their realisation. Wealth has come to him, as the inevitable result of what he has done ; but I have the authority of those in a position to know when I say that many an opportunity of greatly increasing that wealth has been rejected by him because it would have diverted his attention from his one great aspiration.

How Mr. Hill acquired his faith in the north-west may be thought worth briefly narrating. Of Scotch-Irish parentage, he is a Canadian by birth, having been born at Rockwood, Ontario. Owing to the death of his father, he had to start early to earn his own living, and he first worked in a grocery store in his native town ; but

¹ So many prominent railway officials have been associated with Mr. Hill at some time or other of their career that the remark was once made to me,—“Railway men in the United States may be divided into two classes : those who have served under Mr. James J. Hill, and those who haven't.”

at the age of seventeen or eighteen he left Canada for St. Paul (Minn.), where he got employment as a labourer on the docks, and then became a clerk in a "forwarding" house. St. Paul forms the head of navigation on the Mississippi, and goods destined for the fur traders in the Hudson Bay Territory were landed at St. Paul, and thence "forwarded" to the traders, such journeys as that from St. Paul to Fort Garry (the Winnipeg of to-day) having to be undertaken for this purpose. As an *employé* of the firm whose service he entered, and subsequently as a forwarding agent in business on his own account, Mr. Hill undertook many of these journeys himself, and had abundant opportunity for seeing the vast possibilities of the region through which he travelled. He heard, too, from the fur traders and others how, after having been snowed in all winter, they had planted crops in the spring, and had been astonished at the abundant harvest they got from the virgin soil of the almost illimitable prairies.

All these experiences and stories implanted in the mind of the young "forwarder" seeds which were to bear their own fruit later on; but for the time being he went no further than becoming one of the owners and the principal manager of a line of boats plying on the Red River between Winnipeg and Fisher's Landing. Meanwhile the Milwaukee and St. Paul Railroad—which had started in 1851 with a twenty-mile line from Milwaukee to Waukesha—had reached St. Paul in 1867 (becoming the Chicago, Milwaukee, and St. Paul

when the extension to Chicago was effected in 1873), and the St. Paul and Pacific had been building out to the west from St. Paul, eventually reaching Fisher's Landing. But the St. Paul and Pacific became a financial failure, and in that fact Mr. Hill saw his opportunity. He believed that if he could only get control of the line he would be able to do great things with it in the way of opening up the land to settlers, and he consulted with some of his Canadian friends on the subject. A syndicate was formed, consisting of Mr. Donald A. Smith (now Lord Strathcona), Mr. George Stephen (now Lord Mount-Stephen), Mr. Norman W. Kittson, and Mr. Hill, and the bonds and stocks of the line—held mainly in Holland—were nearly all bought up by them; but it was not until the early part of 1879 that this was eventually accomplished, although the lines had gone into the hands of a receiver in 1873. In June 1879 foreclosure decrees were entered, the properties were bid in by the syndicate, and the St. Paul, Minneapolis, and Manitoba Railway Company was formed to take over and operate them.

At this point there come into the story two other individuals whose influence in the development of the north-west, and in the building up of the big freights which the American railways secure there to-day, has been but little less marked than that of Mr. Hill himself. His belief was that when he had secured the construction of a network of railways between the twin cities of St. Paul and Minneapolis on the one side, and

the Red River on the other, with extensions both to the Manitoba frontier and to the Missouri, he would open up a vast territory to wheat-growing. Mr. C. C. Washburn, then Governor of Wisconsin, and himself interested in the milling industry, had ideas that went still further. While concurring most cordially in Mr. Hill's project, he thought that something more than wheat-growing was wanted. A great influx of wheat into the Minnesota markets would, he argued, flood the supply, while when the choice qualities of north-western wheat (mostly spring wheat) were sent abroad they would be simply put on a level with poor qualities from other countries. If, on the contrary, the north-west wheat were turned into flour, and exported in that form, it would preserve its identity, the growers would get a better price, the milling as well as the agricultural interests would undergo great expansion, and, side by side with the farmers, there would grow up an important industrial community, the supply of whose wants would mean a still further substantial movement in many different branches of trade and commerce. The water power represented by the St. Anthony falls, on the Mississippi, at Minneapolis, marked out that city as being especially well suited to become the headquarters of a milling industry of world-wide importance, and to Mr. Washburn's sanguine temperament nothing was wanted to complete his scheme but the working up of markets which would take the flour that Minneapolis could so readily produce.

To this end he induced his partner, Mr. William H. Dunwoody, to undertake the mission of converting the English people to his ideas; for England, with the reputation of the best of all markets for foreign wheat, was regarded by him as the most desirable of all markets for Minnesota flour. I heard from Mr. Dunwoody himself, at Minneapolis, what his experiences were when he duly crossed the Atlantic to carry out this mission, now some thirty years ago. At first the English people had no faith in the new idea. They did not care to open up trading relations with unknown persons 1500 miles from New York, and they advised Mr. Dunwoody to operate through New York agents. This was not what he wanted. Then the millers were willing to buy the flour to mix with their own; but here the aspiration of preserving the distinctive character of American north-west flour would have been defeated. Finally Mr. Dunwoody had to import the flour himself, and employ men to take it round to the London bakers, to whom he allowed three months' credit, and not until after eight months' persistent effort was he able to return to America, satisfied that he had at last established in England the beginnings of what has since become a very big trade indeed in Minnesota flour. The fact that the American millers were among the first to work, on any wide basis, and on really commercial lines, the new process (as it was in those days) of milling by steel rolls, gave the Minneapolis mills a great advantage in the expansion of the trade in question;

and such has been the growth of the business, as a whole, that the total output and export of flour at Minneapolis increased from 6,000,000 barrels in 1885-6 to nearly 16,000,000 barrels in 1901-2.

It is not claimed that the Minneapolis millers now get much direct profit from the flour they send to England, and it is even declared that American flour is sold cheaper in England than in the United States, the explanation given being that the American millers send their surplus output to England in order to reduce operating expenses by running the mills all the year round, instead of shutting them down at certain periods; so that, as one authority on the subject told me at Minneapolis, "If your people in England did not take our flour from us we should have to throw it at them." However this may be, and whatever view may be taken, on the one hand, of this active competition of the American with the British miller, and, on the other, of the advantages conferred on the English consumer, it is evident that the scheme conceived by Governor Washburn, and so successfully initiated by Mr. Dunwoody, worked in admirably with the plans of Mr. J. J. Hill for the expansion of the American north-west; and no proof of this result is more striking, perhaps, than that afforded to-day by the city of Minneapolis, capital of the north-west flour industry. With its handsome streets, teeming population, and really gigantic mills, it suggests one of the most agreeable and most prosperous of American cities,—though a city not seen to the best advantage,

perhaps, during a spell of cold weather when the temperature is 20 degrees below zero, as was the case on the occasion of my own visit.

To return to the railway schemes of Mr. Hill, it is now time to say that he pushed out branch lines in all directions, so that by 1890, when the company was transformed into the Great Northern Railway Company, it already owned 3275 miles of railroad, and a line of steamers on the great lakes. But Mr. Hill was resolved that his railway should be continued until it reached the Pacific. There was then already in existence the Northern Pacific Railway, which provided for a certain amount of trans-continental business; but this line had been built with the aid of liberal land grants from the Government, and Mr. Hill determined to construct another line as (to use an Americanism) "a purely business proposition." That is to say, he would accept no Government help at all, but would demonstrate his absolute faith in the north-west by constructing a through line which should pay for itself. Once more his Canadian supporters came to his help, and the extension to Seattle was duly carried out, though never before in the history of American railways had a line been constructed in the way in which this particular line was built. Mr. Hill had by this time become president of the company, but he was not a president who was content to issue his instructions from a comfortable office either at New York or at St. Paul. He first of all explored every mile of the route himself, some-

times going out practically alone, on foot or on horse-back, and sometimes accompanied by engineers ; but it was he who planned and decided everything, and in laying the line the engineers practically followed the guidance of the president. Nor were they necessarily wrong in so doing, for Mr. Hill had long since familiarised himself, by actual experience, with almost every phase of a railway man's work, down to the humblest and minutest detail. Completed in 1897, the Great Northern route to Seattle constitutes an important addition to the trans-continental lines which are doing so much to expand the industries and the commerce of the United States. At the outset the patronage conferred on it was distinctly poor ; but from the very first Mr. Hill ran his own sleeping-cars and his own dining-cars, however small the number of people then using them. To-day the through trains often go in three sections. As for freight, the Great Northern has not only tapped the resources of the entire northwest as far as the States of Oregon and Washington—each equal to an empire in itself, and each having timbered lands to an extent almost beyond comprehension,—but has established direct connection with harbours that provided a new highway for trade not only with China and Japan, but with Siberia, which Mr. Hill regards as distinctly promising ground. In the great stretch of country between Tomsk and Vladivostok he sees a good field for the sale of American flour, which, grown on the Pacific coast, can be sent

across at a much lower rate than the Russian Government or the Russian traders can transport it from the interior on the Trans-Siberian railway. In this and in other ways important developments are pending for the increase of American trade with Russia and the Orient in general in connection with Mr. Hill's lines.

Hitherto, however, the most marked effect of railway enterprise in developing the American north-west has been seen in the opening up of the country to settlement. In this respect not only the Great Northern, but the Chicago, Minneapolis, and St. Paul Railway has been an active force. It was in connection with the latter line that, as previously stated, Mr. Luis Jackson became the first railway "industrial commissioner" in the United States; and so well have the plans of these and other companies for attracting new settlers, and especially new industries, succeeded in the north-west that during the last few years more than 5,000,000 acres of Government land in the northern part of North Dakota alone (without speaking of other districts) have been taken up under the Homestead Acts, while many of the large farms in that State and elsewhere are being cut up into smaller ones. What is happening all along the various lines of railway in the American north-west is that communities are being established where only a few years ago no one lived at all, that small settlements have become populous cities, that vast areas have been devoted to wheat-growing, and that there is now very little really suitable and desirable land within easy

reach of the railway which has not been taken up for settlement or development. This is one reason why the current of migration has set in so strongly of late years from north-west America to Canada, where the available supply of good land is now more plentiful and much cheaper than in the north-west of the United States. But the whole thing has been absolutely the doing of the railways; and of the various illustrations I have given as to the way in which American railroads assume the *rôle* of pioneers, build in hope, and themselves create the traffic from which they are to draw their revenue, I do not think that any one of them is more striking than the story of what has been done in the north-west.

XVII

THE NEW ENGLAND STATES

My tour through America was brought to a close by a run through New England, where the nearest approach on American soil to the conditions existing in our own country is to be found. The whole district, with its comparatively dense population, its many towns and cities situated so close to one another, its numerous industries, and its "settled look" generally, gives to the visitor an impression quite different from that which he derives from the suggestion of apparent newness characterising so much of what he sees elsewhere in the United States. And in no respect is the resemblance to British conditions greater than in regard to the railways. In travelling about in America one gets so accustomed to seeing streets going straight across the railway lines, or the railway trains themselves going right along the streets, that such conditions are apt, at last, to be regarded as a matter of course. It comes, therefore, quite as a pleasant surprise to the visitor travelling on the New York, New Haven, and

Hartford system to find that on the seventy-five miles of railway between New York and New Haven the level crossings have been eliminated in every instance except as regards the town of Bridgeport, and there the last thirty-two crossings on this section are in process of being taken out, at a cost of \$4,000,000. It is no exaggeration to say that on this seventy-five miles of track I saw more over- or under-bridges than I had seen in the thousands of miles I had travelled in the western States, after getting beyond the outskirts of Chicago. A similar policy is being adopted by the New York, New Haven, and Hartford Company in regard to other parts of their system, which is over 2000 miles in extent, track elevation or road depression being carried out as rapidly as possible wherever there is any considerable traffic. The company are the more ready to do this because, under the laws of Massachusetts, the State pays 25 per cent of the cost of lowering or raising a railway track so as to abolish level crossings, the city in which the work is carried out pays 10 per cent, and the railway company find the remainder. In the year ending June 30, 1902, the company charged to operating expenses for betterments and equipment, to meet general depreciation, a sum of \$3,400,000, this being an increase of \$978,000 over the previous year. Among the items thus charged to operating expenses were improvements at Bridgeport; car shops at Readville; machinery, etc., at Power Station, Berlin, Conn.; elimination of grade crossings at Mattapan, East Long-

meadow, and Great Barrington; additions to Wilkesbarre Pier; icing plant at Poquonnock; engine house, Hyannis; numerous iron bridges to replace wooden bridges; continuation of stone ballasting on Shore Line Division; also the cost of 20 locomotives, 750 steel frame box cars, 100 coal cars, 2 car floats, and partial payments on 42 passenger cars, 250 steel frame box cars, 300 coal cars, and 100 flat cars, besides miscellaneous additional electric and other equipment, and improvements for the comfort and safety of the travelling public.

The New York, New Haven, and Hartford Railroad offers, too, the rare example of an American railway in which the receipts from passengers practically balance those from freight. Thus in the twelve months ending June 30, 1902, the earnings from the passenger department were \$21,223,630, and those from the freight department were \$21,871,642, a difference of \$648,012. In the previous twelve months the earnings from the passenger department were \$19,853,093, and those from the freight department \$19,864,700, a difference of \$11,607. These results are due to the fact that while, on the one hand, there is an abundance of local passenger traffic, there is, on the other hand, far less of that heavy through traffic which tells to the advantage especially of those lines whose geographical position enables them to handle a good share of the trans-continental business. But Boston is looking forward to the prospect of getting more of this class of business

as well, for with the advent of regular lines of steamers from Manchester and Antwerp the port is no longer dependent on tramp vessels for patronage, while the fact, communicated to me there, that a consignment of rails *via* Antwerp for the Pacific coast was on its way to Boston, seemed to be regarded as an augury of possibly important developments in the future.

Then, again, the railways in the New England States are inclined to grapple boldly with the problem of trains *versus* trams. At various places on the New York, New Haven, and Hartford system where street tramways have been constructed to run parallel with the railway, the expedient has been resorted to by the railway company of equipping one of the two sets of line forming the double track with either a third rail or overhead wires, and converting it into an electric tramway, the ordinary cars being utilised for this purpose. The opposition of the street tramways has thus, in certain cases, been very successfully met, although in some instances where this could not be done, or where the balance of advantage was in favour of the tramways, the business has been simply left to them. Mr. John M. Hall, president of the New York, New Haven, and Hartford Company, with whom I discussed these subjects at New Haven, takes it for granted that the electrification of the ordinary steam railway is only a matter of time, but his own practical experiences in this direction seemed to have convinced him that such transformation is not so costly and so

formidable an undertaking as many authorities seem to anticipate.

In regard to the combined problem of electrification and the management of the suburban traffic, an object-lesson is afforded by the new terminal station at Boston (built by the Boston Terminal Company for the New York, New Haven, and Hartford and the Boston and Albany Railroad Companies), which is deserving of the attention and study of railway men all the world over. The station itself, with its twenty-eight tracks on the main floor, and its provision of every possible convenience for passengers—even to the extent of a branch post-office, and the supply of cots in the ladies' room for baby travellers in waiting—is one of the most complete and best arranged I saw in America; but its special distinguishing feature, from an English standpoint, is the fact that underneath the main station there is a loop line for suburban trains to be operated by electricity. This lower station is not yet open for traffic, but I had the privilege of being shown over it by Mr. J. C. Sanborn, manager of the Boston Terminal Company. The lines forming the double track which constitutes the loop start half a mile away on the incline leading to the sub-station, and they form inside the station an inner and an outer circle, between which there is a platform capable of accommodating over 30,000 persons. The trains on either line will be entered from this central platform, and passengers leaving them will be required to do so from

the other side of the train, so as to facilitate operations. The sub-station is only about ten feet below the street level. The actual loop extends the full width of the terminal station, that is to say, close on 700 feet, and there is ample accommodation on either track for four trains to stand thereon at the same time. Trains using the station would, however, remain there only just sufficient time to load or unload passengers, as at any ordinary wayside station. The suburban traffic would, in fact, be dealt with in a continuous stream without any interference with long-distance travel, and with none of the delays in the reversing of engines, etc., which characterise the ordinary railway terminus in a great city. On the other hand, it does not follow that arrangements which may answer perfectly well at Boston would be equally adapted to the conditions of London traffic, such as are found at, say, the Liverpool Street station of the Great Eastern Railway. The Boston station is used daily by 801 trains, which convey in and out an average of 68,500 passengers; whereas at Liverpool Street station there are 1100 trains dealt with during the course of twenty-four hours (over eighty will come in or go out during a single hour in the busiest part of the day), and the number of passengers brought in or taken out on an average week day is 169,000, or 100,000 in excess of the number to be provided for at Boston.

Boston further presents the novelty of an electric railway which runs partly on an "elevated" steel

viaduct along the streets, and partly along a subway under the streets, such subway being also used for ordinary tramcars running on adjoining tracks. There is naturally a steep incline for the descent from "overhead" to "underground," but the trains run with perfect safety, and in the busy hours of the day they carry a vast number of passengers. Yet in Boston, as in New York and Chicago, the elevated railway, however great a convenience, is noisy, unsightly, and obstructive, and it is profoundly to be hoped that the people of London will never be called upon to tolerate such an infliction. The mistake made at Boston was in not having a subway throughout, instead of an arrangement which is strongly suggestive of an electric switchback.

XVIII

RAILWAY ACCIDENTS IN THE UNITED STATES

THE comparative safety of railway travelling in the United States and the United Kingdom respectively may be illustrated by the following figures derived from the official reports for 1901 :—

In the United States	one passenger killed in	.	2,129,382
" United Kingdom	" " " "	.	7,432,120
" United States	" " injured "	.	120,386
" United Kingdom	" " " "	.	415,672
In the United States	one <i>employé</i> killed in	.	400
" United Kingdom	" " " "	.	1,019
" United States	" " injured "	.	26
" United Kingdom	" " " "	.	39

The compilation of statistics relating to railway accidents in the United States is undertaken by the Interstate Commerce Commission, an Act of Congress, passed in 1901, compelling "common carriers engaged in interstate commerce" to make a monthly report to that commission of all railway accidents

occurring on their lines, penalties being imposed in the event of non-compliance. But, unlike our own Board of Trade, the Interstate Commerce Commission has no power to order any inquiry into the causes of accidents, and, except where loss of life has occurred, and a coroner's inquest is necessary, it is left for each railway company to investigate any accident occurring on its system, and to punish negligent servants in such way as it thinks fit. Even when an inquest is held, in case of any person or persons being killed, the powers of the coroner's jury are much more restricted than is the case in the United Kingdom, and the bringing to his trial of any individual guilty of culpable negligence is a far more complicated matter.

The statistical information collected by the Interstate Commerce Commission from these monthly reports is issued in the form of quarterly "Accident Bulletins," and these bulletins contain some very instructive facts and figures. No. 4 of the series gives, in addition to the usual returns for the previous quarter, complete tables for the year ending June 30, 1902. Casualties to persons during that period are set out as follows:—

[TABLE

	Passengers.		Employés.	
	Killed.	Injured.	Killed.	Injured.
Collisions	130	2298	425	3,065
Derailments	37	1194	229	1,380
Miscellaneous train accidents (excluding the above), in- cluding locomotive boiler explosions		94	43	601
Total train accidents . .	167	3586	697	5,046
Coupling or uncoupling cars While doing other work about trains or while attending switches		1	83	3,566
Coming in contact with over- head bridges, structures at side of track, etc.	7	38	104	1,070
Falling from cars or engines, or while getting on or off .	99	1250	537	6,867
Other causes	30	1214	952	15,049
Total (other than train accidents)	136	2503	1819	28,665
Total all classes	303	6089	2516	33,711

Total passengers and employés—killed, 2819 ; injured, 39,800.

Especially significant, in view of what I have said as to the primitive conditions still in vogue on many of the American lines, is the table in the "Accident Bulletin" dealing with collisions and derailments, and damage to cars, engines, and roadway during 1902 :—

[TABLE

	Number.	Loss.
Collisions due to trains separating . .	774	\$391,489
Other collisions	4268	3,894,194
Total collisions	5042	\$4,285,683
Derailments due to defects of roadway, etc.	547	\$443,706
" " equipment	1609	1,295,299
" " negligence of trainmen, signalmen, etc.	255	136,241
" " unforeseen obstruction, etc.	239	546,478
" " malicious obstruction, etc.	57	63,246
" " other causes	926	874,753
Total derailments	3633	\$3,359,723
Total collisions and derailments . .	8675	\$7,645,406

Then, again, every one interested in railway matters will remember the controversy that arose in Great Britain a few years ago concerning the use of automatic couplers, a disposition being shown in some quarters to compel the railway companies here to adopt such couplers, in the same way that they are now compulsory on the American lines. There is no denying the fact that such safety appliances represent a marked improvement over the more or less dangerous practices previously in force in America; but when one finds that during the course of a single year no fewer than 143 railway servants were killed there, and 2130 injured, as the result of accidents while coupling or uncoupling cars, the complete value of these American methods may well be questioned. The detailed figures as to the causes of the accidents in question include the following :—

	Killed.	Injured.
Sticking of parts (bent pins, etc.) preventing quick work	3	35
Holding up pin by hand (presumably made necessary by defective uncoupling mechanism)	2	130
Other causes apparently due to defective coupler mechanism	1	74
Coupling on inside of sharp curve	3	101
Foot caught while adjusting coupler	1	111
Engaged in operations preliminary to coupling	32	161
While coupling safety chains	1	37
Uncoupling without using lever (presumably by reason of defective uncoupling mechanism) .	8	91
Coupling damaged cars (presumably an unavoidable risk)	6	70
Miscellaneous	26	571
Not clearly explained	29	427

Another table published in the "Accident Bulletin" gives the accidents due to trains parting, and sets out — so far as is known — the cause of such partings. Among these one reads that "couplers pulled out" led to 3 trainmen being killed and 29 trainmen and 1 passenger injured; "knuckle broken," 20 trainmen and 3 passengers injured; "knuckle worn or defective," 10 trainmen and 4 passengers injured; "coupler lock worn, defective, or broken," 5 trainmen and 1 passenger injured. The totals are:—

	Trainmen.		Passengers.		Cost.
	Killed.	Injured.	Killed.	Injured.	
Due to known causes	3	95	...	11	\$156,067
Couplers parted, cause unknown .	11	225	...	55	336,714
Grand total .	14	320	...	66	\$492,781

The report explains that the items shown in this table are gathered chiefly from two classes of accidents, namely (a) collisions due to the trains breaking in two, and (b) derailments due to the same cause (usually the pulling out of the whole coupler); and it adds that "the significant item" is the one showing that "two-thirds of this enormous loss of property and eleven out of the fourteen deaths are chargeable to coupler failures which the railroad companies have reported as due to some cause unknown." Personally, and especially after what I have seen of damaged freight waggons on the great trans-continental lines, I should be disposed to say that the tendency to load behind the powerful locomotives every car that they can possibly draw has a good deal to do with the coupler failures.

This subject of the automatic coupler is also dealt with in the *Sixteenth Annual Report of the Interstate Commerce Commission*, issued December 15, 1902. Reference is made to the decrease in the number of accidents, and the report continues:—

But casualties continue to occur, and their number is such as to call for continued and earnest efforts to eliminate their causes. We have the automatic coupler, but there are dangers against which it does not fully provide. Cars are frequently moved while not in complete running order. . . . There is much complaint among trainmen that some couplers, being of bad material or workmanship, do not work properly: cars coming together do not couple except by a somewhat violent impact. This leads to breakage and to delays and annoyances. The men go

between the cars to prepare for a second trial (when the first is unsuccessful), and sometimes are crushed or otherwise injured. . . . The uncoupling levers or rods and their connections are a source of many injuries—probably from 20 to 30 per cent of all coupling accidents now reported. The fault with these parts is attributable to bad design and imperfect maintenance. . . .

The report of the chief inspector . . . shows that during the fiscal year ending June 30, 1902, the ten inspectors examined 161,371 cars. . . . The number on which one or more defects were found was 42,718. . . . The poor maintenance of locking pins, a vital part of every coupler, calls for criticism, the number of defects reported under this head being 559. Almost one-fourth of the 559 cases were "wrong pin or block," a broken pin having been replaced by one not designed for that particular pattern of coupler. "Worn knuckles" is a serious defect which shows an increase.

If the movement for the compulsory enforcement of automatic couples on British railway companies is not already a "dead horse" (which appears to be the case), these official reports of American experiences should suffice to give it the *coup de grâce*.

Another of the annual tables in the "Accident Bulletin" to which I should like to call attention is that which gives the causes of accidents to *employés* classified as falling from and getting on or off cars and engines. It lends additional emphasis to what I have already said as to the dangerous practice of brakemen having to walk along the top of the cars while the train is in motion, and there are other figures besides which well illustrate the dangers of American railway service:—

Causes.	Conductors.		Brakemen, etc.		Engineemen.		Firemen.		Other Employees.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
Fell from roof of box car by reason of—										
Defect in car	...	3	2	90	...	...	...	...	1	2
Ice or snow	...	3	3	73	...	...	...	1	...	...
Parting of train	...	7	12	81	...	...	...	1	1	2
Derailment, collision, or shock due to abnormal movements of cars other than those in subclass 3	2	19	21	265	...	3	1	10	4	27
While setting brakes	...	7	27	221	...	...	...	...	...	4
Fell from—										
Coal car	...	...	4	13	...	...	...	...	...	5
Freight car other than box or coal car	...	3	1	15	...	...	...	...	...	5
Engine or tender	2	8	38	295	1	40	9	183	...	19
Passenger car	...	1	...	13	...	1	...	...	...	7
Engines, tenders, or cars (all kinds) not in motion	...	5	3	170	...	46	...	79	...	31
Miscellaneous causes	8	122	71	1567	1	22	...	64	18	370
Not clearly explained	6	21	157	460	...	6	2	25	19	76
Slipped getting on moving trains or cars	3	39	32	407	...	2	...	3	12	89
Jumping off moving trains	2	42	20	374	...	...	...	2	10	91
Jumping from engines or cars anticipating collision, derailment, or other accident	...	6	...	91	...	19	1	42	3	9
Fell from engines or cars by reason of defective handholds and sill steps	...	12	1	144	...	...	...	3	...	7
Getting on or off moving engine	1	49	31	723	3	80	1	97	3	78
Caught in frog, guard rail, or switch	...	1	...	16	...	...	...	...	...	...
Total	24	348	423	5018	5	219	15	460	70	822

Grand total—killed, 537; injured, 6867.

In that portion of the "Accident Bulletin" which relates to the quarter ending June 1902, as distinct from the year ending at that period, one gets more detailed information as to the specific causes of railway accidents in the United States. Here there is a list given of twenty-six of the most costly collisions occurring during the three months, and such explanations thereof as were forthcoming. Some of these I append :—

Enginemen failed to properly control speed ; had been on duty 22 hours, with 5 hours' rest within that time.

Conductor misread order ; engineman took his word for it. Experience of conductor, 46 days ; of engineman, 16 days.

Freight approached station at uncontrollable speed in dense fog ; the persons killed [2] were passengers in the train standing at the station.

Engineman fell asleep approaching station ; had been on duty 7 hours, succeeding a period of 20 hours' rest.

Engineman miscalculated distance necessary in which to stop his train ; on duty 7 hours and 30 minutes, following 3 hours' rest following 21 hours on duty.

Inferior train encroached on time of superior ; conductor and engineman, both with fairly good records, deliberately "took chances" of using about 5 minutes of superior train's time.

Conductor and engineman of freight "took chances" on reaching a certain station before passenger train left there.

Error of train despatcher ; a man of 16 years' experience ; had been on duty 5 hours.

Failure of air pump ; too high speed in view of imperfect condition of air brakes. Conductor of foremost train knew that by reason of this his train was in special danger of being run into at the rear, yet did not apprise his flagman of the fact.

Conductor and engineman of work train, in reading time-table, overlooked passenger train.

Train left station without orders while train-order signal was against it.

Freight train, at night, collided with cars which had run out from a side track. These cars had been placed on side track by a man of 1 day's experience, he having been entrusted with this duty by a foreman of 3 months' experience.

Engineman approached station too fast ; claimed air-break pipe leading to cars had been closed ; but there are indications that the real cause was that he slept on his engine ; his past record as an engineman was not good.

Conductor of passenger train misinterpreted order, and engineman apparently took conductor's interpretation. Four passengers killed. Operator wrongfully delivered a clearance card.

Block signalman gave clear signal when the block section was not clear.

Freight train ran into passenger train of another road at right-angle crossing. No fixed signals at crossing. Conflicting testimony as to which train was most blameworthy.

Conductor and engineman of one train overlooked orders which had been delivered to them.

Men in charge of a freight waiting on a side track for three passenger trains started after two of them had passed, and their train was run into at the rear by the

third passenger train. Most of the wreck was destroyed by fire.

As the result of these accidents 30 persons were killed, 187 were injured, and the damage to cars, engines, and roadway amounted to \$228,597.

The statistics in the "Accident Bulletin" deal only with casualties to passengers and *employés* on duty resulting from railway accidents in the United States, and do not include the killing or the injuring of the general public at level crossings or elsewhere. On this point, however, the following facts and figures for the year ending June 30, 1901, are given in the *Sixteenth Annual Report of the Interstate Commerce Commission*:—

The total number of persons other than *employés* and passengers killed was 5498; injured, 7209. These figures include casualties to persons classed as trespassers, of whom 4601 were killed and 4858 were injured. The total number of casualties to persons other than *employés* from being struck by trains, locomotives, or cars was 4135 killed and 3995 injured. Casualties of this class occurred as follows:—At highway crossings: passengers killed, 3; injured, 11; other persons killed, 828; injured, 1343. At stations: passengers killed, 21; injured, 344; other persons killed, 378; injured, 553. And at other points along track: passengers killed, 6; injured, 27; other persons killed, 2899; injured, 1717.

These figures surely afford ample justification for all that I have said as to the danger of the level crossings still

so common in the United States, and also of the ordinary American railway stations, where there are no foot-bridges and no subways, and passengers have to cross the metals as best they can. Altogether, I would suggest that in the face of these most melancholy lists of killed and wounded it is a somewhat illogical proceeding to bid English railway managers go to the United States for ideas as to the best way of working their lines with a minimum of risk to life and limb.

XIX

MISCELLANEOUS

SIGNALLING

THE imperfections of the original signalling arrangements on the American lines are being steadily superseded by improved methods. When the earliest of the railways were started the trains were run simply by giving to one so much start of another, on the single track then universal, trusting to chance that the second would not overtake the first, and that trains coming in opposite directions would be able to pass one another at the times and places arranged to that end. The natural result was that serious accidents occurred, and the system of organising the traffic by means of "train despatchers" followed. The railways could not afford to have signalmen at every desirable interval or passing point, and the idea was evolved of having a train despatcher stationed at the headquarters of a particular division, with a sheet of paper before him giving the actual position of every train on the lines included within that division, so that, by means of telegraphic communication

with the agents at the different stations, he could direct the movements of the various trains and arrange where they should pass. It was an occupation that resembled the playing of chess by telegraph, and it became still more complicated when a double set of rails was supplemented by a third set, on to which a slow train could be turned, and could still proceed on its journey while a fast train continued on the other rails, to which the slow train would be again transferred at a point further on when the line was clear. Compared with a perfect system of block signalling, such as prevails in Great Britain, the work of the train despatchers on the American lines may seem to be decidedly crude; but it was the natural development of the limited means, the primitive methods, and the absolute necessity for economy with which the railways started, and one cannot but admire the ingenuity of American railway pioneers in evolving a system which enabled them to control, as well as they did, and at so moderate a cost, long lines of railway, the traffic on which would not then have warranted any considerable expenditure on a more perfect system of signalling.

Many thousands of miles of railway in the United States, and especially in the less populated territories, are still operated by train despatchers, who have developed into an exceptionally skilled class of men, and from whose ranks some of the most eminent officials in the American railway world have sprung. In course of time, however, it was found that, though the system

worked out well on paper, the proneness of human beings to err introduced risks and dangers which occasionally had serious results, and various improved methods were introduced on certain of the lines, the latest development being represented by the system of automatic signalling. Several English railways are experimenting with this system, so far, I understand, with good results, and American railway men certainly speak very highly of it. Told in the fewest of words, the principle of automatic signalling is that at certain points on a line of railway an electric wire is connected with each rail, and the current is completed by the wheels of the locomotive. The result is that when a train passes, say, point A, the electro-pneumatic apparatus sets the signals immediately behind it at "danger"; when it reaches point B it sets the signals there at "danger," and those at A at "caution"; when it passes C it sets the signals there at "danger," those at B at "caution," and those at A at "clear," and so on. In this way the train is always protected in the rear by two sets of signals. There is also a semi-automatic system of signalling, under which a passing train automatically moves a signal to "danger," but that signal will not go to "clear" again until it is so set by the operator in a signal-box, and even he cannot so put it until the train has passed out of the section.

On the Pennsylvania lines the Westinghouse electro-pneumatic automatic signalling is now in operation practically all the way from Jersey City to Paoli, Pa., a

distance of 104 miles. On the New York division, which represents a total length of 90 miles between New Jersey and Philadelphia, the automatic system commences 1200 feet from the terminal station at each end, and is continued throughout the remainder of the distance, the signals in use in the entire division being as follows :—Westinghouse automatic electro-pneumatic home and distant signals, 1229 ; telegraph block signals (on branches), 76 ; interlocking signals, manual and power, 471 ; distant switch signals, 30 ; drawbridge signals, 20 ; flag station signals, 30 ; total, 1856. The staff required to work or maintain these signals number 127—namely, 32 repairmen, 29 battery-men and helpers, 4 division foremen, and 62 interlocking and clock signal lampmen. The theory is that, but for the automatic signalling, a very much larger staff of signalmen would require to be stationed in signal-boxes along the line of route in question, and that the wages of such men are saved except at the points where there is interlocking to be done. The system, I was told, received a severe test during the blizzard of March 1901, when great havoc was done to telegraph wires and the ordinary signalling arrangements, whereas the Pennsylvania lines between Jersey City and Philadelphia continued working as usual. It is further declared that in the experience of the Pennsylvania Railroad Company the instances of a failure of the automatic signalling arrangements average only one in every 160,000 operations.

I sought the views of a number of prominent railway

men as to the practicability of applying the automatic system of signalling to English railways, and, though there was a certain doubt as to the suitability of automatic signals in the immediate neighbourhood of large stations or of busy traffic, it seemed to be generally thought that such signals might be usefully employed on stretches of line where there was comparatively little interlocking to be done, and where the automatic signals could be used either to supplement existing arrangements or, more especially, as a substitute for signalmen located in signal-boxes at points where they are required only in the interests of the block system. From the point of view of the American railway official an important consideration—if not the most important consideration—was the saving effected in the number of men employed, and, consequently, in the cost of labour; and, though it was admitted that the installation was expensive, it was argued that the system was one that paid for itself in the long. Still, the fact remains that, out of the 200,000 existing railways in the United States, only (and these mostly main lines) had been automatic signalling appliances. In regard to block signalling, the Census of February 1903 showed that only 1,000 miles of the United States then had automatic signalling. The system was nearly 30 years old, and covered only 4,000 miles in 1903, out of a total of the mi

is evident that the greater amount of the track is still under the charge of the train despatcher. In Great Britain, on the contrary, railways are forced by the Board of Trade to adopt the absolute block system on all lines over which passenger trains run, only one train being allowed on one section at one time, except in the case of railway station platforms.¹ Even, therefore, if we assume that the automatic signalling is entitled to all the praise that American railway men claim for it, and that to this extent the American railways are in advance of the British, it is none the less evident that, taken as a whole, the provision made on our own lines to ensure the safety of travellers is far greater than is the case in the United States.

The general adoption of automatic signalling on English railways will in any way ensure greater

¹ On the question of the adoption of the block system in the United States, Lieutenant Wake says in his recent report to the Board of Trade on the subject:—"Block working is not so generally interpreted in England; two or more trains are allowed to run on the same section at the same time, and under certain conditions, to travel in either direction. On lines where the lines are doubled or tripled, it occurred to the train in which I was travelling to cross from the proper track to the wrong track, and without any formalities of any kind, the conductor of a train ordered the train to go on the wrong track, regretting that we had not travelled in this direction, there being, of course, no signal to prevent the train. Such a misunderstanding might have occurred in any order, or any

safety to railway travellers, because nothing could be safer than the strict application of the block system. The possible advantage to the public would be a saving of time in the running of trains, inasmuch as shorter sections could be worked than is now the case ; and the possible further advantage to the railway companies would be in the saving of wages, though this is a less material consideration in Great Britain than in the United States, where the cost of labour is so great. There is a disposition among English railway men to think that while automatic signalling will probably be the system of the future, especially as a means of supplementing existing arrangements, there is no need for them to recommend the adoption of methods which they regard as still immature, or to go, at present, beyond such close investigations and practical experiments as they are now conducting, in the hope and expectation that some substantial improvements in the automatic system will be effected before long.

While dealing with this question of signalling I might mention that there are railway men on the other side of the Atlantic who pride themselves on the ingenuity with which they decrease the risk of collision between trains on different lines of railway passing one another at right angles. The point of junction is protected by signals which give the right of way to the train on one line, and will require the train on the other line to stop. But if the driver of the second train should fail to perceive, or should disregard, the danger

signal, he will not run into the other train, for the same operation that sets the signal at "danger" acts upon a "derail," so that the train which is in the wrong will run off the line and fall into the ditch,—if there should be one alongside. In this way there is an accident to one train only, instead of two. All this is clever enough, no doubt, and may serve the case of railways which have had to economise in the cost of construction; but the British method is the commonplace one of making one train pass over or under the other, and those who have adopted it may be pardoned for thinking that, after all, it is the better system of the two.

THE CAPTURE OF THE SMALL SHAREHOLDER

Some years ago the problem arose on the Illinois Central Railroad as to what would be the best means to adopt to get the largest possible number of people resident in the territories served by that system to take a practical interest in the welfare of the line, and the expedient was resorted to of sending out agents to induce farmers, shopkeepers, and others to become small shareholders in the concern. This, in itself, might not seem to be a very hopeful proceeding, but a special inducement was offered, for every shareholder in the company, no matter how small his holding, was to have a free pass to Chicago and back once a year so that he could attend the annual meeting of the company. The pass was available for the return journey

any time within seven days of the date fixed for that meeting, but it was left entirely to the discretion of the shareholder whether or not he really went to the meeting. The idea speedily gained a high degree of public favour. A free pass for the 900 miles between New Orleans and Chicago—or for shorter distances in the case of intermediate points—was a consideration to the man who either had business to do in the north or wanted to go there on a pleasure trip, the annual meeting being generally fixed for the holiday season; and the number of small shareholders steadily increased. At first some of them did, as a matter of conscience, put in an appearance at the Chicago meeting, but they found the proceedings so formal and dull, from their point of view, that they did not attend again. That, of course, made no difference to the company. The material point gained was that, whether the small shareholder attended the meetings or not, he was interested in the line, and would be certain to “ship” his goods by it. As for the free pass for himself, it was calculated that that involved no loss, for a man going north in the holiday season would probably take his wife with him, and for her, of course, he would have to pay; the availability of the pass for seven days prevented the overcrowding of particular trains, while it was more than likely that the shareholder would purchase in Chicago machinery or goods which he would naturally consign by the particular railroad of which he had become—part proprietor!

INTER-URBAN TRAMWAYS

For a variety of reasons which I need not stay to discuss, tramways are still more highly developed on the other side of the Atlantic than on our own, and not only has the principle of private ownership encouraged the construction of tramways for long distances into country districts, but the system of uniform fares enables people to travel—as in New York, Pittsburg, and elsewhere—distances of from twelve to fifteen miles for five cents. In some places the tramway lines have simply absorbed the traffic between certain points once served by the railways. But what makes this competition still more serious from the standpoint of the steam railways is the new phase which has been entered on in America in regard to the operation of inter-urban tramways. The practice hitherto generally followed of laying such tramways along the ordinary roads and highways is being abandoned in the United States in favour of lines which run between towns along a private right of way. The primary advantage of this arrangement is that the electric tramcars get clear of the street traffic, and can go at practically any speed to which the available power is equal. A subsidiary advantage, in the view of the American companies concerned, is that they get a perpetual right to their track, instead of only a franchise from the municipalities for the use of the public highways for a limited number of years.

At Los Angeles, Cal., an important network of tramways on this principle has been started by the Pacific Electric Railway Company, the president of which is Mr. H. E. Huntington, who, from a conversation I had with him, is strongly convinced that the tractive force of the future is electricity, notwithstanding the fact that it was from the steam railways that his famous relative made his fortune. The company in question was formed only in February 1902, yet by the following July it had (among other things) completed and begun to operate a new line of tramway between Los Angeles and Long Beach, a favourite seaside resort twenty-one miles distant. This line I had an opportunity of inspecting under the guidance of Mr. Epes Randolph, the vice-president and general manager of the company. The cars start from the streets of Los Angeles in the ordinary way (though the company will soon have ready a central tramcar depôt in Los Angeles 285 feet by 211 feet in dimensions, and fitted with every convenience for passengers), but as soon as possible on reaching the outskirts of the city the track leaves the highway and enters on what seems to be, to all intents and purposes, an ordinary railway line, fenced in on each side and having a double set of rails, but provided with overhead wires for the purposes of the electric current. There are very few curves in the track, and the grade is uniform throughout, while the road-bed of the line seemed to be as solid as that of any well-built railway. Our car, being a "special," ran

express from Los Angeles to Long Beach (the car being slowed down when roads were crossed), and the journey was done in just over half-an-hour. The company expect that when they get the full amount of the power for which they have arranged they will run their "express" cars at the rate of sixty miles an hour; though the full equipment would then allow of a speed of seventy-five or even of ninety miles an hour. Any such speed as this would, of course, be maintained only along those parts of the track which represent the private right of way, and would not be attempted either at Los Angeles or at Long Beach, where the ordinary streets are passed through. In addition to carrying passengers the company propose to organise an early morning freight service, which would collect garden produce at points along the line and deliver it at the Los Angeles market, close to which the tramway passes, a greater inducement being thus offered to market gardeners to establish themselves further away from the city than they are at present disposed to do.

These developments at Los Angeles are significant of a good deal that is going on in the United States, though the company in question may be in an especially favoured position, because it hopes eventually to get electricity equal to 25,000 horse power, at a cost of only about half-a-cent per horse power per hour, by generating it at the Kern River, and conveying it thence to Los Angeles, a distance of 200 miles.

THE SUBURBAN TRAFFIC PROBLEM AT CHICAGO

The question of providing "workmen's trains" enters but very little into the problem of the suburban traffic as experienced at Chicago, for the sufficient reason that the artisans' quarters are now mainly in the city itself. There was a time when they stood on the outskirts, but the city has expanded to such an extent (the population having increased in thirty years from 297,000 to over 2,000,000) that the said quarters have been absorbed therein, and his preference for the "life" of the city leads the average workman to stop where he is rather than go further afield, where rents might be cheaper but recreations would be fewer. It is, in fact, the professional and mercantile rather than the industrial classes who live in the suburbs of Chicago, and for whose transport provision must be made. This provision has taken the triple form of surface railway, elevated railway, and tramway. The elevated railway and the tramway became serious rivals of the ordinary railways, the uniform fare of five cents which they charged for any distance being an inducement to many people to discontinue paying, say, ten cents to travel to their suburban destination by the surface railway. To meet this difficulty the Illinois Central Railway Company, who had a very heavy suburban traffic in and out of Chicago, and eight tracks of road available, arranged to run a series of express suburban trains, alternately with their existing service of stopping

trains, between Rudolf Street, in the city, and Hyde Park station, some six miles out. Beyond Hyde Park the express trains became stopping ones. It was found that a great number of people were willing to pay ten cents for an express service which took them to their destination in fifteen minutes or so, in preference to saving five cents on another route which occupied thirty or forty minutes. In this way any prejudicial effects from the competition were checked, and, judging from the degree of patronage given to the trains, there is nothing now for the railway company to complain of.

The question they are now considering is, rather, that of how to deal the most efficiently and the most economically with the great amount of suburban traffic they get, and such consideration has led Mr. Albert W. Sullivan, assistant second vice-president of the Illinois Central Railroad, to design an entirely new type of passenger car, which should be running by the time that these lines come before the reader. In conversation with an American railway official on the subject of passenger cars in general he remarked to me:—"My opinion is that your English railways will have to resort more to the American style of corridor cars for long-distance journeys, and that the American railways will have to adopt carriages with side instead of merely end doors for suburban traffic." It is apparently under the same impression that Mr. Sullivan has acted. The car he has designed will have a total length of 70 ft.



6½ in., with twelve sliding doors on each side (in addition to the usual end ones), but the operating mechanism for opening or closing them will be controlled exclusively by an attendant at the end of the car, so that the passengers will have no power over them, though they will be able to raise or lower the sash with which each door will be furnished. In explaining to me the construction of the new car, Mr. Sullivan said that what he aimed at was not only to ensure a speedier means of loading or unloading suburban cars than was possible under the present system of entering or leaving by the two end doors only, but also to eliminate the danger that arose—when there were side doors of the type used on English railways—from passengers attempting to enter or to leave the train while it was in motion. By putting the doors under the control of an attendant who would open or close them all at the same moment, the passengers would be kept from running any risk, for they could not leave prematurely, while, the doors being once closed, they could not be opened by a belated passenger, who, also, would find nothing on the side of the car that he could hold on to. Internally each car will have seating capacity for 100 passengers, and the seats are arranged in sets down the centre so as to leave a gangway on each side, thus enabling the passengers to walk along the entire length of the car in search of a seat, should there be any scarcity of them. In this way, it is claimed, there would be a saving of

time compared with the use of separate compartments as in England, since the passenger would enter the car by the first door he came to, and find his seat while the train was moving—passing from one car to another if necessary—instead of keeping the train waiting while he walked up and down looking into each compartment for a vacant seat.

LUGGAGE AND PARCELS

The American system of dealing with luggage is based on the general principle that a "check" in the form of a metal tally is given to the passenger as a receipt for each piece of luggage conveyed for him, the production of such metal tally being necessary before the luggage is given up again at the other end. But the predominating factor in the situation is that for the vast majority of travellers in America cabs practically do not exist. That is to say, the charges demanded by the drivers of such cabs as are to be had (and only a few will be found even at large stations) are so high that scarcely any railway traveller, except those with whom money is no object, would think of engaging one unless compelled so to do. For any distance under one mile the charge for an ordinary cab may be taken as 4s., an additional 2s. having to be added for the second mile. On certain of the leading lines the railway companies have introduced at their terminal stations privileged cabs for which a minimum

charge of 2s. is made, but these are comparatively few in number, and do not count in the case of a person wanting to drive to the station.

The outcome of these conditions in the United States has been the organisation of a system of Transfer Agencies, otherwise local express luggage agencies, as distinct from the through express agencies, to which I shall refer later on. The course of procedure to be followed is this :—The intending traveller who has, say, a trunk which he desires to take with him on his journey, must give notice to the transfer agent, some three hours in advance, that the trunk is to be collected and delivered at a certain station in time for a certain train. A person staying at an hotel can arrange this through the head porter. On the trunk being fetched the owner thereof receives a "check," which he must present at the outward baggage room of the railway station not less than ten minutes before the departure of the train. He claims his trunk, gives instructions as to the train by which it is to go, and on producing his railway ticket (which entitles him to 150 lbs. of free luggage) he receives a railway company's check in exchange for that from the transfer agent. He then takes his seat in the train, and need trouble no more about his luggage until he nears the end of his journey. Then he will find the agent of another transfer company going through the train, and to that person (if he wishes to save himself trouble) he will give the check, thus authorising him to collect the

trunk from the railway company, and deliver it at the hotel or house to which he is going. As wraps and rugs are unnecessary in American trains, owing to the system of heating adopted, he will probably have with him only a valise or hand-bag, and he will thus be able either to walk to his destination or proceed there by tramcar. The trunk he has left behind will be brought on. If he is going to an hotel not far away he may expect to have it delivered to him within an hour; if to a private house within the ordinary radius, the time taken will be from two to three hours, and if he is going any distance into the suburbs he may have to wait considerably longer. The charge made by the transfer companies for collection at the one end and delivery at the other will range from 25 cents to 50 cents for each handling, so that his total expenditure on each piece of luggage checked will range from 2s. 1d. to 4s. 2d. according to the scale of charges of the particular companies with whom he deals. This will come cheaper than if he took a cab at each end, and he is saved much trouble; but he must finish his packing several hours before he starts on his journey, and it may, as I have shown, be several hours before he gets his trunk again when he has completed his journey.

Under the English system, on the other hand, the traveller need not conclude his packing until a few minutes before he starts (and this, surely, is a consideration in the case of journeys having to be

undertaken hurriedly), he takes a cab to the station, getting for 1s., a drive for which the American cabman would charge 4s., his luggage is labelled and put in the van, he claims it at the end of his journey, has it put on another cab, pays another moderate fare, and arrives at his destination having his luggage with him—a matter of great convenience should he have to dress at once for dinner, and rendering unnecessary the expedient which the American must resort to in such circumstances, that, namely, of carrying his dress clothes in a dress-suit case.

I think, therefore, I am warranted in the remark made above, that the predominating factor is the cab, the difference between the dollar fare in America and the shilling fare in England being quite sufficient to account for the difference of the two systems. From the American standpoint the weak point in the English practice is that the passenger has no guarantee, during the time he is separated from his luggage, that it will not get into wrong hands. The American traveller cannot believe it will be "safe" unless he has a check for it. But in point of fact the cases of luggage being claimed and carried off by thieves, when it is put out from the guard's van, in England, are exceedingly rare; and it would seem that English people prefer to run the risk, and be able to claim their luggage and drive off from the station at once, rather than suffer the delays which a check system must necessarily involve. In point of fact, one of the leading English railway

companies did introduce a "check baggage," or, as they called it, a "registration of personal luggage" system, a few years ago; but, although the widest publicity was given to the scheme, there were so few people who thought it worth while to pay threepence a package to have their belongings absolutely secure that the experiment was abandoned at the end of a year.

The fact is that the "luggage in advance" system in force on our English railways serves all the purposes that are answered by the American system, and it is very much patronised, especially by visitors to sea-side resorts. The luggage is collected by the railway company, it is carried by them, and it is delivered by them at the given address. The difference is that the cost is substantially less than it is in America. There three companies, at least, will be concerned in the operation, —two transfer companies and the railway company. Agencies which undertake the complete arrangement will charge one dollar per package. In England a railway company will do it all at an inclusive charge of a shilling per package. Then, again, a traveller on an English railway can generally have his luggage sent on to him to any address within the company's limits for a fee of sixpence or so per package, as against the 1s., 1s. 6d., 1s. 8d., or 2s. which an American transfer agency would require for a like service.

In addition to these local transfer agencies there are in the United States the great express agencies which deal with through parcels of general merchandise, as

distinct from passengers' luggage. These express agencies have existed since almost the earliest days of the American railways, when, no doubt, it was found convenient by lines which started with none too much capital to leave the goods and parcels service mainly in the hands of separate organisations. Such, indeed, is still the practice to-day, each of the great trunk lines being associated with an express agency which has a monopoly of the transport work over its system; though there is reason to believe that in many instances a close financial interest exists between the two companies, the railway company owning all, or a large part of, the stock in the express company with which it co-operates, or the express company having a substantial holding in the railway company. In any case the express company runs its own cars by the passenger trains, employs the men who handle the parcels, and has its agents in leading towns and cities and at every station on the line on which it operates, the station-master being its paid representative at places where there is only a small amount of business to be done. At large terminal stations the space taken up by the parcels rooms of these express agencies is very considerable, as the following figures in respect to some typical rooms will show :—

[TABLE

Station.	City.	Parcels Room.	Length.	Breadth.
			Feet.	Feet.
Grand Central	New York	Outward	300	30
Broad Street	Philadelphia	"	80	70
"	"	Inward	120	70
South	Boston	"	515	30
Penn. Railway	Washington	Outward and		
		Inward	180	15
Union	St. Louis	Outward and		
		Inward	300	30

The table given on page 276 shows the rates on parcels of general merchandise, including collection and delivery within usual limits, charged by the Adams' Express Company (which is affiliated with the Pennsylvania System, the Burlington System, the Chesapeake and Ohio, the Louisville and Nashville, and the New York, New Haven, and Hartford), comparative English charges for the same distance and service being given in *italics*.

It will be seen that in the case of light parcels carried a short distance the American charges are considerably higher than the English. This is due, no doubt, partly to the fact that the absence of a parcel post gives the express companies a monopoly for small packages, and partly to the higher expenses to which an American express company is put for collection and delivery as compared with an English railway company, while in the one country there are two companies to make a profit—the express company and the railway

New York to	Distance.	Weight of Parcel.						
		2 lbs.	6 lbs.	12 lbs.	25 lbs.	50 lbs.	75 lbs.	100 lbs.
Newark (N.J.)	Miles. 9	<i>s.</i> 1 0½ <i>d.</i> 0 4	<i>s.</i> 1 0½ <i>d.</i> 0 6	<i>s.</i> 1 0½ <i>d.</i> 0 6	<i>s.</i> 1 0½ <i>d.</i> 0 7	<i>s.</i> 1 3 <i>d.</i> 1 3	<i>s.</i> 1 7 <i>d.</i> 1 7	<i>s.</i> 1 8 <i>d.</i> 1 8
Rahway (N.J.)	20	<i>s.</i> 0 4 <i>d.</i> 0 4	<i>s.</i> 1 0½ <i>d.</i> 0 6	<i>s.</i> 1 0½ <i>d.</i> 0 6	<i>s.</i> 1 0½ <i>d.</i> 0 7	<i>s.</i> 1 3 <i>d.</i> 1 3	<i>s.</i> 1 7 <i>d.</i> 1 7	<i>s.</i> 1 8 <i>d.</i> 1 8
Trenton (N.J.)	57	<i>s.</i> 1 0½ <i>d.</i> 0 4	<i>s.</i> 1 3 <i>d.</i> 0 8	<i>s.</i> 1 3 <i>d.</i> 0 8	<i>s.</i> 1 5½ <i>d.</i> 1 7	<i>s.</i> 1 10½ <i>d.</i> 3 2	<i>s.</i> 2 6 <i>d.</i> 4 8	<i>s.</i> 2 6 <i>d.</i> 6 3
Philadelphia (Pa.)	91	<i>s.</i> 1 0½ <i>d.</i> 0 4	<i>s.</i> 1 5½ <i>d.</i> 0 8	<i>s.</i> 1 5½ <i>d.</i> 1 0	<i>s.</i> 1 8 <i>d.</i> 1 7	<i>s.</i> 2 3½ <i>d.</i> 3 2	<i>s.</i> 3 1½ <i>d.</i> 4 8	<i>s.</i> 3 1½ <i>d.</i> 6 3
Harrisburg (Pa.)	195	<i>s.</i> 1 0½ <i>d.</i> 0 4	<i>s.</i> 1 8 <i>d.</i> 0 8	<i>s.</i> 2 1 <i>d.</i> 2 6	<i>s.</i> 2 6 <i>d.</i> 2 11	<i>s.</i> 3 9 <i>d.</i> 4 0	<i>s.</i> 5 0½ <i>d.</i> 6 3	<i>s.</i> 5 0½ <i>d.</i> 8 4
Pittsburg (Pa.)	444	<i>s.</i> 1 0½ <i>d.</i> 0 4	<i>s.</i> 1 10½ <i>d.</i> 0 8	<i>s.</i> 2 6 <i>d.</i> 2 11	<i>s.</i> 2 11 <i>d.</i> 2 1	<i>s.</i> 4 0 <i>d.</i> 4 2	<i>s.</i> 6 0½ <i>d.</i> 6 3	<i>s.</i> 6 0½ <i>d.</i> 8 4
Chicago (Ill.)	912	<i>s.</i> 1 3 <i>d.</i> 0 4	<i>s.</i> 2 8½ <i>d.</i> 0 8	<i>s.</i> 3 4 <i>d.</i> 1 1	<i>s.</i> 4 0 <i>d.</i> 2 1	<i>s.</i> 5 0½ <i>d.</i> 4 2	<i>s.</i> 7 9 <i>d.</i> 6 3	<i>s.</i> 10 0½ <i>d.</i> 8 4

company—as against only one—the railway company—in the other. In the case of heavier packages carried for a long distance the charges of the express companies are substantially smaller, in proportion, because for this class of traffic they are virtually competitors with the ordinary goods service of the railway companies themselves, and they seek to offer a special inducement to the public to consign through them by the passenger trains, instead of through the railway companies direct by their freight trains.

THE POLICY OF COMBINATION

One of the points connected with American railways upon which considerable criticism has been aroused of late is that policy of combination which has led to the absorption of small lines by great, or to the amalgamation of already great systems, the general tendency being for the railway interests of the country to get into fewer and still fewer hands. In some quarters this tendency has been regarded with a certain degree of alarm, and the combinations effected have been spoken of as if they were on the same level as the ordinary American “trusts,” for which few persons beyond those who are profiting by them have a single good word to say.

Dangers there undoubtedly may be if the policy in question is carried too far, but the fact has not, perhaps, been realised that the American railway companies are

only doing to-day, on a larger scale in their larger country, what the leading British railway companies did many years ago, when the trunk lines incorporated so many smaller ventures, and made up for themselves "great" systems, to the advantage of every one concerned. But in the case of many of the American railways the said policy has been in part a policy of self-defence, forced on them more or less by the peculiarities of a position with which there is no analogy in Great Britain. Lunching one day with the president and officers of a leading railroad in America, I commented on the evident ease with which new railways could be started there, and the president rejoined, "If you like we can call our solicitor down and form a new railroad company before you leave the room." Given the possession of funds enough, it seems to be open to any one, in most of the States, to start a new railway when and where he pleases, subject to only a few formalities, and many a line has been so started for purely speculative purposes, in order to force the hands of some other company, if not to compel them to buy up the new-comer.

One result of a competition that thus became not only reckless but too often absolutely unscrupulous, added to an ordinary competition which may have been legitimate enough in its way, was a war of rates in which various companies sought to outbid one another for such traffic as was offering, and I have heard of instances where the rates have been "cut" so

low that the amount paid by the purchaser of a railway ticket has not been equal to the commission given by the railway company to the passenger agent for selling the ticket. There was a time, for instance, when the tickets from Chicago to Kansas City cost only 50 cents, while the rates from the Missouri River to San Francisco were "cut" in various stages from \$90 to \$5, which was the exact amount the agents received for themselves. Conditions such as these had a good deal to do with the fact of so many companies drifting into the hands of receivers, and even some of the stronger companies suffered considerably, while under the existing "free trade in railways" there was no knowing how long those which had escaped would remain safe from attack. Thereupon a policy of "community of interests" was started, under which the larger companies, while still preserving their individual entity, operated on a common basis, and thus not only afforded a greater guarantee for the observance of published tariffs, but, in checking any rate-cutting tendencies among themselves, also presented a bolder front against the adoption of any such tactics on the part of other companies. The associations they formed to this end were, however, declared to be illegal, and there was then adopted the counter-expedient of buying up bonds or shares in other companies, so as to obtain a controlling influence in them, and in that way prevent the practices in question.

The creation of strong trunk lines by the absorption

or consolidation of numerous small and more or less weakly companies had already been actively proceeding to the distinct advantage of the travelling public. The New York, New Haven, and Hartford Railroad, for instance, represents a combination of a considerable number of individual railways, many of them being at one time bankrupt roads, not properly equipped, and only a score or so of miles in extent. Dwellers in the New England States had everything to gain from the "merging" of all these small and impoverished lines into a system which, as already said, now approaches more nearly to English ideas of railway perfection than any other on the American continent. Then, again, there was a time when a person going from New York to Chicago went over the lines of eight or ten different companies, booking afresh and changing cars at various stations, and even passing, at one place, from one gauge of railway to another. The amalgamation policy which allowed of the journey being made without change on the system of a single company was assuredly a distinct gain to the public. Then in the journey south from Chicago a similar difference of gauge between the lines of two companies was met by a device by means of which the cars, with the passengers still inside them, were lifted bodily from the bogey trucks of the one system and put on to those of the other system. Still more curious, perhaps, was the fact that at a certain stage of the same journey the signals which meant on the one line "go back," meant on the other line "go ahead."

In these cases combination between the companies concerned led to not only uniformity of gauge, but uniformity of working. Elsewhere combination meant the construction of bridges or tunnels the cost of which would have been beyond the means of small independent companies. In this way there was avoided the need of running the cars on to ferries, and crossing rivers in that way, or such a sight as that once to be seen at Baltimore, where the cars that now pass through a tunnel were dragged through the streets of the city by horses.

In circumstances such as these the policy of railway amalgamation became as inevitable in the United States as it proved to be in Great Britain, and the conveniences of travel were proportionately increased; but in the case of the United States the special consideration already mentioned—as regards the need of strengthening the defence of existing interests against an unreasonable and destructive competition, for which no parliamentary sanction, as known to ourselves, was required—had much to do in stimulating the general movement.

As the original multiplicity of small independent lines thus began to be succeeded by a greater degree of consolidation, there was brought into existence in the United States a body known as the American Railway Association, which has been a powerful factor in promoting the principle of uniformity in the working of American railways. One of the earliest and most useful results accomplished by this association was the

establishment of standard time. It divided into four zones—Eastern, Central, Mountain, and Pacific—the 3000 miles of territory across which the trains ran in going from ocean to ocean, and to each zone it gave a fixed and definite “time.” The new system met with much opposition, especially from those who employed labour by the day, and objected to any rearrangement of working hours, or who were influenced only by feelings of local pride; but it was soon generally recognised as a valuable innovation, and it not only became a great convenience to the railway companies in getting rid of the previous confusion, but was the means of saving them many thousands of dollars. Then the association formed separate committees on “train rules,” “car service,” “arbitration,” “safety appliances,” “interlocking and block signals,” “statistical inquiry,” “standard dimensions of box cars,” “metric system,” “standard cipher code,” etc., and in many ways it has systematised or standardised the working of American railways, so as not only to secure the desired greater uniformity, but to promote also the convenience and safety of the travelling public, to improve the freight arrangements, and to effect economies in management and operation which have had a most beneficial effect on the question of rates.

All these results would hardly have been secured had it been necessary to deal with a vast number of small, independent, and more or less rival lines; but when the representatives of a certain number of large

systems could meet together and talk things over among themselves, the possibilities of restoring chaos to order, and securing reforms beneficial to all concerned, were greatly increased.

It may be that some of the consolidations, or semi-consolidations, in the United States have been based on purely financial considerations rather than on those indicated above. It may be further possible that the public will not always be able to get such reduced terms from one large combination as from a number of small and rival concerns, each more or less desirous of cutting the throats of its competitors. But, whatever the motives, and whatever the assumed danger, the combination policy—(whether in the form of actual amalgamation or of mutual agreements and understandings through an association)—with its community of interests, its decrease of cut-rate tactics, and its practical discouragement of blackmailing rivalry, has done much towards putting the existing lines on a sounder financial basis. Nor, so far, is there much evidence that the interests of the public have actually suffered from this policy. Criticism has not yet gone much further than prophesying what may happen, and demanding that restraints shall be imposed in respect to things which railway companies might do, rather than things they have actually done, or purpose to do. In point of fact, the competition among the American railways to-day is a competition of service rather than a competition of rates, which, in spite of occasional exceptions, are now

fairly stable; and the traders have far more to hope for from this stability of rates—the direct outcome of the community of interest principle—than they had from the uncertainties and the preferences which were in vogue before that principle was established.

The reader will see, therefore, that American railway combinations are not necessarily to be regarded from the same point of view as the ordinary American “trust.” They are even, to a certain extent, a means of self-defence against the “trusts” of traders who became so powerful a few years ago that they were able to force their own terms on individual railways, to the detriment of the smaller traders, so that as one very competent authority on the subject has said: “The trouble with the rates to-day is not in diminishing the revenues of the railways so much as it is in preventing the wiping out or extermination of business men of all kinds excepting the large enterprises that have large volumes of freight to offer.”

In saying all this I give simply the expression of my own views, based on the outcome of such inquiries as I was able to make in America, and to these views I commit no one but myself. Neither would I argue that all railway combination is necessarily good, inasmuch as each case should and must be taken on its own merits. What I really seek to show is that the subject is a much more complicated one than is generally supposed, and presents considerations apt to be lost sight of by those who seem to think that all railway

combination is necessarily bad. The one thing certain is that the "community of interest" principle, coupled with the possibility of effecting greater economies, will lead to a further expansion of this railway combination policy in the United States, whatever the law may say on the subject; for the United States seems to be a country where laws are made for railway companies to get round them more or less, and such companies make no scruple about doing so when, as happens from time to time, they consider that the laws are opposed to the welfare of the general economic conditions, and trace in them the hand of the politician rather than the hand of the patriot. It is one of the curiosities of the railroad position in the United States that in all the earlier part of their career the railways were a law to themselves, being given practically *carte blanche* in the laying and the operating of their lines, and receiving every possible encouragement therein; but now that the companies have done so much, and become so strong and powerful, the law-makers are seeking to obtain over them the supremacy which at one time they were ready enough to forego, so that to those who can read between the lines there is a special significance in certain developments of the last few years. On many points—such as the provision of safety appliances—the American railway companies have readily complied with provisions made in the interests either of their *employés* or of the public; but in various other matters their readiness to obey has been less pronounced, and

they have found that results which cannot be achieved in one way can often be secured in another. I do not stop to argue the point whether such an attitude is justifiable or not ; but, all things considered, I see no reason for rejecting a prophecy which was repeatedly made to me in American railway circles,—that in course of time the railroads of the United States will inevitably be found grouped together into some ten or twelve, or, at least, some eighteen or twenty great systems. The number of “operating” railroads there to-day is still something like 800.

TON-MILEAGE STATISTICS

On the precise value of the passenger-mile and ton-mile statistics, the compilation of which is made compulsory on American railways by Act of Congress, there would seem to be a considerable diversity of opinion even among American railway officials themselves. On the one hand I have heard the opinion expressed that such statistics are of the greatest value to railroad executive, traffic, and operating officials ; and on the other hand it is protested that for the purposes of current check on economical working the figures are valueless. At first sight there seems to be hopeless confusion between the two sets of views, and one hardly knows which side to credit. It is significant, however, that the favourable view is expressed mainly by accounting officers, while the unfavourable view is

that of general and district superintendents. In the one case, therefore, one seems to get theory, and in the other, practice. Theoretically it is of the highest importance that the railways should have some common form of operating statistics which will enable them to conduct such operations intelligently and economically; but practically it is declared that the figures in question are not received by the officers responsible for the moving of the traffic until after a delay of from thirty to fifty days; that they take no account of the meteorological conditions prevailing at the time of the movement; that they make no allowance for whether the section to which they refer consists of a gathering ground or a purely intermediate section where through full trains only are dealt with; and that they provide no fair and accurate means of comparing one district with another. So it has happened on one line of railway, at least, that when the accountant, who believed in the statistics, has complained — on their authority — that the earnings per mile were too low, the general freight agent, who doubted their value, has shown that the apparent falling off was due to the increased quantity of grain that was being carried, this grain being, in point of fact, one of the most profitable forms of traffic they had. What might happen is this:—A railway company conveying, say, for a short distance a comparatively small consignment of grain for a single local shipper, would be put to a certain amount of trouble and loss of time for which it would

have to charge, so that here the earnings per mile would be high ; whereas if the same company were asked to take a complete train load of grain across its system, and had nothing to do but to couple a locomotive to the cars and haul them to their destination, it could afford to accept a low rate, and the earnings per mile would appear to be decidedly low ; but the profits in the latter case would be substantially greater than in the former.

In an interesting review of the general situation, presented to the American Railway Association in 1901, Mr. E. F. Knibloe pointed out that originally railroad operating statistics consisted of a sort of periodical balance - sheet, showing amount of earnings, cost of operation, and net result. But—

As railroad managers became more progressive and desirous to avail themselves of the best methods in vogue, and as competition became more intense and the margin of profit narrowed or disappeared, and the demand for higher economy and efficiency became inexorable, the field of comparison broadened, and railroad officers sought for whatever of information or suggestion could be gleaned from the reports of other roads. Equally imperative is the fact that the leaders and organisers of the great movement towards the consolidation and combination of systems and interests which distinguishes the present era of railroad development must look to these statistics for an exposition of the efficiency of the management of the properties in which they are interested. . . .

Unfortunately, of all the units available for the

measurement of transportation work, none are absolutely uniform. The net ton as the unit of weight, the statute mile as the unit of distance, and their product, the ton-mile, are all, in the abstract, constant units ; but in practice, owing to the varying resistance introduced by grades, curves, and other imperfections of track surface and alignment, by weather conditions and other causes, the work actually performed, of which the ton-mile is the unit of numerical expression, may differ, and generally will differ, for every unit of distance traversed. The actual work represented by the car-mile is affected both by the circumstances just referred to and by the different weight of cars. As to the ton-mile these variations are not radical. They do not exist in that unit itself, but result from extraneous influences. As to the car-mile they are both inherent and extraneous. In neither case can they be wholly eliminated or mathematically represented. In neither case, however, are they predominant, and they probably do not involve a wider margin of error than exists in all or most sociological, industrial, or financial statistics.

Mr. Knibloe, therefore, finds a justification for the use of the said units ; but there is a special significance in the fact that a Committee on Statistical Inquiry, which was appointed by the American Railway Association in 1898, and has been more or less active ever since, has recently been enlarged and strengthened for the purpose of making an exhaustive investigation of the subject of railway statistics "in order to ascertain if a better unit than the ton-mile can be devised." It is understood, also, that there is no probability of

any early report being made by the committee, "as the subject is a difficult one to handle."

In the opinion of one very competent authority in the American railway world, who was good enough to discuss this subject with me, ton-mile statistics are incomplete unless they give the figures per commodity as well; and it would seem that the Interstate Commerce Commission is inclined to require the railway companies to give this further information. The reply, I was told, which the railway companies would probably make to this demand was that they could not give the information, because they had not got it. My authority added that on the system with which he was associated the full figures per ton per mile per commodity were at one time prepared for a series of years, but they were found to be of very little practical value, and their compilation was abandoned when the office room taken up by the ten or fourteen clerks engaged on them was wanted for other purposes. To revive these statistics now would involve the line in question in an expenditure of about \$20,000 a year. On another important line of railway in the United States the company have absolutely declined to yield to the pressure being brought to bear on them by the Interstate Commerce Commission to publish the cost per ton, the reasons given being—(1) That the figures had necessarily to be based on estimates; (2) that they were averages only, and therefore useless; (3) that as some of the traffic had to be hauled 30 miles and other traffic

1000 miles, they gave no basis to work upon. There would seem to be still another difficulty which I heard suggested in various quarters—that if the railway companies were to publish the cost of moving commodities per ton per mile, endless trouble would arise with the traders, who would not stop to think that such figures were necessarily exclusive of a variety of standing or other charges, and would at once seek for reductions in the rates in the belief that they were paying too much. .

To sum up the situation: Whatever may be the theoretical value of all the elaborate statistics in question, the testimony of a considerable number of general and district superintendents of American railways shows that for the purpose of checking the economical movement of freight they rely on the following statistics as representing what they consider the controlling factors:—(1) Car load; (2) engine load; (3) earnings per train mile; (4) cost per train mile. So far, therefore, as regards the views and experience of practical officials, there is little or no difference between English and American practice on this much-debated subject.

PROMOTIONS OF STAFF IN RAILWAY SERVICE

In the opinion of Lieut.-Colonel Yorke the American railways are ahead of the English in their method of selecting men for employment, and in the opportunities they offer for advancement, and he bases these views

on some information given to him "by one of the chief railway officials in the States."

What the official in question told Lieut.-Colonel Yorke with regard to the qualifications of applicants for employment—that they should be of sound health, free from all infirmities, of good character, etc., and likely to develop ability sufficient to merit advancement—applies just as much in Great Britain as it does in the United States.

The next point is :—

All *employés* are regarded as in the line of promotion, and examinations for promotion are held from time to time as may be required.

In practice the examinations for promotion in the United States are very much the same as those that take place in Great Britain when it is desired to raise a man from one position to another. There is no fixed examination either on the American railways or on the British, but the men are examined by their superior officers as to their fitness for the post, and the best man is appointed.

Then it is said :—

Applicants who fail on the first examination must within one year make written application for re-examination. Those who fail on the second examination will be dropped from the service.

This represents ideal rather than actual conditions, for the shortage of labour is such that if a man fails to

meet the approval of his superior officer when next in turn for promotion he is allowed to go on in his present or in some other position.

It is further asserted :—

Flagmen, brakesmen, and firemen who do not apply for examination within five years may be dropped from the service.

They “may” be, but in practice it is not likely that they are, for here again the shortage of labour applies. In one district where inquiries were made into the matter it was stated that out of nearly 300 firemen only one had been in the service for two years, and the bulk about one year, so that it was hardly probable the companies would discharge firemen who had had five years’ experience. Owing to the scarcity of labour it is no unusual thing for firemen to be made drivers after having had less than two years’ experience of running. Lieut.-Colonel Yorke’s authority went on to explain that—

The object of fixing a limit of five years to the term of service of a flagman, brakesman, or fireman is that these occupations are considered as preparatory training for the positions of conductor and engineman, which are the fixed types of employment in the transportation service, and a person who has not the capacity to qualify for either of these positions after five years’ service is not likely to do so at any time, and should make way for those who are more capable and progressive.

It may be that when America is over - populated, and there is a larger number of competent men clamouring for employment on the railways than there are openings for, these ideal conditions will be enforced, but that is hardly the case at present. Meanwhile one of the reasons given for the larger number of railway accidents in the southern as compared with the New England States is that in the former the shortage of labour renders it necessary that a good deal of railway work should be intrusted to negroes or whites of small capacity and less experience, whose carelessness too often leads to disaster either to themselves or to others.

The American system is, in fact, worked very much like the British,—that is to say, subject to a man being ordinarily intelligent, industrious, and sober, there is always some post on the line for which he is fitted. If he is no good the supervision should be such as to ensure his not remaining in the service at all ; but to say that in actual practice a man who has not the capacity or the inclination to qualify for the position of driver or conductor after five years' service is got rid of is as incorrect in regard to the United States as it would be to say it in regard to England. In every phase of industrial and commercial life one finds men in subordinate posts who are rendering most useful service there, but are unequal to positions requiring greater skill, or involving increased responsibility, and would shrink from accepting them. In the same way

numbers of firemen on the American railways decline any promotion to the position of drivers, and grow gray in the service as firemen ; but to discharge them simply because, though making excellent firemen, they did not feel able, or did not want, to rise to higher things, would be a harsh procedure that would entitle the railway companies—in common with other employers of labour in similar circumstances—to blame rather than to credit.

Lieut.-Colonel Yorke's leading railway official further said :—

In this way it happens that every man employed upon an American railway has the road open to him to rise to the highest positions, and many of the most prominent men in the railway world have so risen.

The same is the case in Great Britain ; but now that the management of railways is becoming more scientific than was formerly the case, it is necessary that those in charge should have had a better training than the self-made man who rises by sheer ability to a high position. The result of this necessity has been most marked in the case of the Pennsylvania Railroad, which occupies the premier position among the railways of the United States. Most of the recent appointments to the post of general superintendent on this great system have been conferred on young men who have gone through the civil or mechanical engineering departments, the reason being partly because they will have

to deal with locomotive superintendents and divisional engineers, whose work they should thoroughly understand, and partly because the matters coming under their attention will have so great a bearing on the physical conditions of the line,—the raising or the depression of busy roads to avoid grade crossings, the provision of new tracks, the most efficient utilisation of locomotive power, and so on. Whatever, therefore, may be the theory as to every man on a railway having the road open to him to rise to the highest positions, it is evidently becoming increasingly difficult in present conditions for a man so to rise without the possession of a technical training, for the lack of which the ordinary qualities of perseverance and native talent will not atone. Such difficulty, too, must be experienced in an even greater degree in the United States than in the United Kingdom, inasmuch as the physical problems to be solved in the railway world of the former country are much more acute than is the case in the latter.

XX

CONCLUSIONS

BEFORE starting on my tour of the United States I had heard or read so much in praise of the conditions existing on American railways that I expected to bring back with me a long list of recommendations deserving consideration on this side. But the more I looked for and inquired after any special advantages that were really suited to British conditions, and desirable of adoption here, the greater my difficulty in finding or learning of any became.

In respect to track the British railways, as a whole, are distinctly in advance of the American railways, as a whole, though the best of the latter are fully equal to the best of the former. As regards the relative merits of the chair and no-chair system of laying the rails, that is a disputed point which the experts must settle for themselves; but in the matter of fencing, and in the carrying of the railways above or below the street level, the superiority is undoubtedly on the side of the British lines. London presents no parallel to New

York, where, on the Eleventh Avenue, the ordinary traffic of a busy thoroughfare passes over twenty-five sets of railway track forming practically the shunting or switching yard of the New York Central and Hudson River Railroad Company; and nowhere in England would trains go for a mile or so along the streets of an important town, as at Syracuse, N.Y.

In the matter of signalling arrangements the general system in the United Kingdom is superior to the general system in the United States, whatever may be the advantage of the automatic signalling carried out there to a certain limited extent, and forming a matter of close inquiry and careful experiment on the part of English railway officials.

With a few exceptions American railway stations are distinctly inferior to railway stations in Great Britain, especially in the lack of over-bridges or subways by which passengers can get safely from one side to the other without having to cross the metals and dodge the incoming or outgoing trains as best they can. Among the exceptions I would specially commend the Union Station at Boston; and I cannot but think it a particularly happy idea, adopted there, that a great railway station, through which so many thousands of people pass daily, should have a room set apart for the purposes of—a post office. This, at least, is an innovation that might deserve the consideration of our Postmaster-General.

The shorter journeys in the United Kingdom render

unnecessary such elaborate arrangements as are found in America for persons travelling for several days and nights in succession, while much of the luxury so provided is due, not to the legitimate needs or demands of the public, but to the keen competition of different lines bidding either for a good share of passenger traffic not yet sufficiently great to satisfy them all, or for the patronage of persons who are likely to consign their freight by the lines they travel, the passenger traffic, which too often does not pay, thus becoming a "feeder" to the freight traffic, which does. This said luxury, too, is found mainly in the limited trains, and the enjoyment of it involves a substantial addition to the fare. Taking the ordinary type of rolling-stock, I should say that the corridor carriages to be found on the main-line trains of British railways, for the use of which no extra fare is charged (except in the case of sleepers), are far superior to the alleged first class, or, as I have described it, the "omnibus" class, of the American railways. The same is equally true of the newer type of compartment carriages on this side. The open car, having only one class, may be accepted on tube railways, where the journeys are short; but it is doubtful if it would be regarded with favour in the case of ordinary surface railways, and it cannot be considered a complete success even in America, considering that not only are Pullman cars run there to serve the purpose of a real first class, but that even these cars have their separate "compartments" for people

who are prepared to pay higher rates in order to keep to themselves. For short-distance journeys the ordinary type of English carriage, with its distinctive classes, seems to be well suited to English tastes; while in the case of such long-distance journeys as can be taken in our own circumscribed limits the British railway companies, by means of their latest types of corridor carriages, seem to be meeting every reasonable requirement of the travelling public.

That the baggage check system, which answers so well in the United States, would be equally applicable or equally acceptable here is a matter open to very considerable doubt. All the advantages of the transfer agency system are practically provided for under the existing arrangements of the leading companies, if intending passengers care to avail themselves of them, and the express agency system is sufficiently met by combination of railway parcel service, the parcels delivery companies, and the parcel post.

America certainly offers examples of the electrification of railways that are deserving of study, and there are various labour-saving appliances in the way of coal tips in the harbours, coal elevators for supplying locomotives with fuel, turn-tables operated by the steam from the engines, and so on, that may well claim attention. A comparison of casualties on the railway systems of the two countries is distinctly favourable to British railways, while with ourselves a greater degree of security is afforded by the guarantee that every

accident will be the object of close and independent investigation by Government officials. That the compilation of railway statistics is carried to a far greater extent in the United States than is the case in the United Kingdom is undeniable, and the adoption of such a course may be necessary in view of the special conditions of American traffic; but the practical value of some at least of these statistics, the compilation of which involves much trouble and expense, is questioned even in the United States, so that their adoption in Great Britain is not yet to be recommended, even if it were proved that, assuming they have been a success in America, they are equally applicable to the special conditions of British railway traffic.

On the subject of freight no one can for a single moment doubt that with the great quantities of produce or merchandise they secure, and carry for distances so vast, the American lines have been able to effect great economies in their operating expenses by reducing the cost of handling, especially through the construction of their larger locomotives and waggons. Yet, as I have shown, the conditions existing in Great Britain are such that it by no means follows that what can be done, and done with undeniable success, in the United States would be equally capable of application in our own country. One of the shrewdest of American railway presidents, and one possessing a good knowledge of English conditions, replied to a question I put to him on this subject: "There is just the danger that

English railway companies might be driven by adverse critics into adopting American methods for which the special nature of their traffic is not suited. It would be useless to merely construct cars of larger carrying capacity unless you had proportionately larger amounts of freight to put in them. I doubt the wisdom of your adopting American sizes ; but what could be done is to decrease the weight of the car relatively to that of the load." In this connection I might also recall the remarks made by Lord Cawdor at the meeting of the shareholders of the Great Western Railway Company in February 1903, when he said that "unless they could fill a ten-ton truck with a reasonable load it was hardly worth while hauling about one of twenty tons"; while at the Great Northern meeting in the same month, Lord Allerton presented a statement showing the results of one ordinary day's work at one of the stations on that line, the figures given being as follows :—Total number of consignments, 985 ; total number of packets, 4427 ; total weight, 123 tons 2 cwt. ; average weight per consignment, 2 cwt. ; average weight per package, 62 lbs. ; total number of trucks used, 53 ; average load per truck, 34 cwt. It is possible that other English lines might show better returns, but comparing such statistics as these with the evidence afforded me in the United States of complete train-loads being made up of single commodities—grain, fruit, tea, etc.—I fail to see on what ground the general adoption of the American size of freight waggon could be recommended in England.

It would seem to the average person to be a matter for increasing, if possible, the amount of the freight carried rather than increasing the size of the waggons themselves. If the British railways only had American lots they would, no doubt, be ready enough to get the American type of waggons to put them in, supposing, of course, that the traders carried out all the reconstruction and re-arrangements on their own premises that the use of such waggons would involve. It has been suggested that instead of sending small consignments in separate waggons, each to a single station, the railway companies should combine them, and make one car of the whole, for a certain section of route. But this arrangement would cause great delays in delivery, and it would be useless for the traders in a series of towns to hope to receive their goods with the same promptness and regularity as at present. What is now happening is that the British railway companies are closely investigating the subject and are making or contemplating such changes and adaptations as are really suitable to the particular conditions under which they work ; but to recommend the adoption in Great Britain of the American sizes of locomotive and freightwaggon, simply because they answer in that country, would be a rash procedure which, in the circumstances, I do not think I should adopt.

One thing quite certain is that what there is to be gained from American experience the British railways are evidently willing enough to learn, for most of the

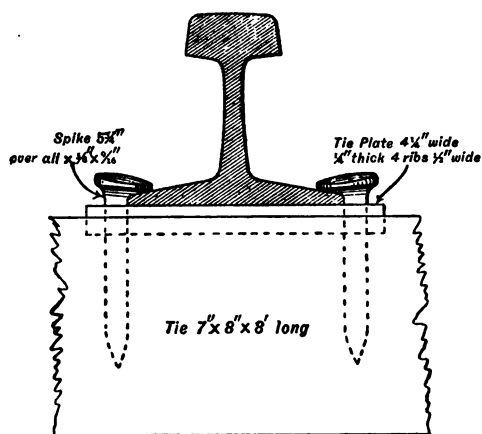
important lines send over periodical deputations to America to study methods and conditions there, and to investigate anything that is new in the railway world, just as the American lines send officials to Great Britain to inquire into our own arrangements, especially in regard to the handling of our passenger business, for which they express unqualified admiration. On the eve of my leaving New York for Europe, I heard of the arrival there of a deputation of ten prominent officials of the London and North-Western and Caledonian Railways on one of these periodical visits, and as I write these lines I notice a newspaper paragraph referring to a visit to the United States of a similar deputation on behalf of the Lancashire and Yorkshire Railway Company. In fact, were it not for the extreme amiability, combined with an almost unwearying patience, shown by American railway officials towards inquirers from this side of the Atlantic, and their readiness to go to any amount of trouble in order to afford all the information in their power, I should say that their exceeding good nature had been somewhat unduly taxed. I can only hope that this is not the case, for if it were I should have to reckon myself as among the worst of the offenders.

As for my own verdict on the subject of American railways, it is, in effect, the same as that which was pronounced in regard to British railways by an American railway official who was sent to Great Britain to study our own system, and who, on being asked to give his

unbiased judgment thereon, replied: "British methods are well adapted to meet British conditions, just as American methods are well adapted to meet American conditions, and there is very little for either to learn from the other."

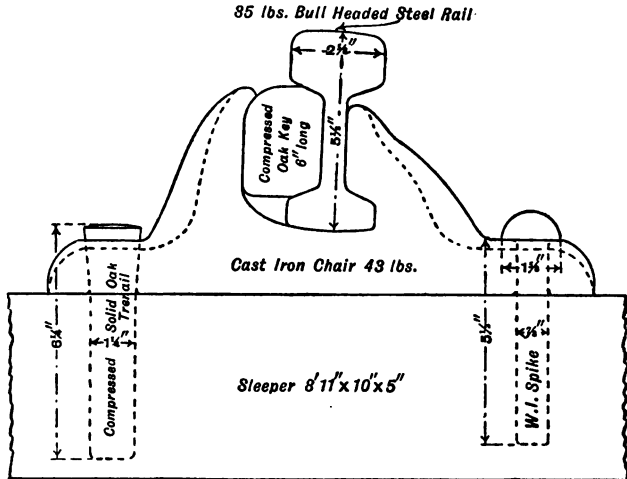
APPENDIX

THE following sketch, for which I am indebted to Mr. W. J. Wilgus, chief engineer of the New York Central and Hudson River Railroad, shows the manner of spiking the rails to the track ties, or sleepers, as adopted on the American railways.



To allow of a comparison of the American practice with the English I give also a sketch of the standard permanent way on the Great Eastern Railway, with which I have been favoured by Mr. J. Wilson, the chief engineer of that line.

The apparent simplicity of the American system is regarded there as fully compensated for by the fact of a



much larger number of sleepers per mile being used than is the case in England, the difference in this respect being illustrated by the following table:—

Name of Road.	Ties.			Bearing Surface per 80 ft.	Percentage of Bearing Surface above Pennsylvania Standard.	Number of Ties per mile.
	Number to 80-ft. rail.	Width.	Length.			
Pennsylvania Standard . .	14	7"	8' 6"	69.42	0.0	2464
Pennsylvania Old Standard . .	16	7"	8' 6"	79.34	14.3	2816
Other U.S. Roads . .	18	7"	8' 6"	89.25	28.6	3168
L. & N.W., England . .	10	10"	9' 0"	74.97	7.7	1760
L. & S.W., England . .	1	10"	9' 0"	82.50	18.8	1936

To these figures it may be added that the New York Central and Hudson River Railroad is now using a 33-ft. rail, resting on twenty sleepers.

With the vast timber supplies in the United States the original use of a large number of sleepers, to give the lines the greater stability which English railway engineers seek for in the use of chairs, was a matter of no great concern, and not only were the component parts comparatively inexpensive and readily procurable, but track-laying such as this could be carried out by practically unskilled labour. This same abundance of sleepers, too, was at first supposed to compensate for the most primitive kind of ballasting. Even the non-technical reader will see, therefore, how much more cheaply the early railways in America could be built than has been the case in Great Britain. But, apart from motives of economy, the American railway engineers have kept to their original method of attaching the rails to the ties, because they really believe it is preferable to the English method. There would seem, in fact, to be a hopeless difference of opinion between the two countries on this question of chair or no-chair, each, apparently, being firmly convinced of the superiority of its own system. Thus one American expert remarked to me on this subject:—

In my opinion we could not run our heavy concentrated weights on rails which rested on chairs. We should be afraid of fracture under our severe conditions. By having our rails in direct contact with the ties we secure, as we think, much greater strength. But whether you retain your chairs or not, there is no doubt in my mind that if you had our heavy loads you would have to have your sleepers closer together.

On the other hand, Lieut.-Colonel Yorke says in his report on American railways:—

The lateral support afforded to the rails by the English chair is of the greatest value, especially on curves, and in America the absence of chairs renders it necessary to use rail braces, which are of the nature of small steel brackets or struts, to support the rails at any place, such as a curve or switch, where there is much lateral pressure. It is also usual in many places to employ bearing plates between the rails and the ties so as to increase the bearing of the rail on the tie, and to afford mutual support to the spikes. The effect of these tie plates, however, is to shear off the heads of the spikes. The fact that these additions are found to be necessary shows that the American mode of construction is lacking in certain elements of stability which are inherent in the English type of permanent way.

THE END



To renew the charge, book must be brought to the desk.

DATE DUE

